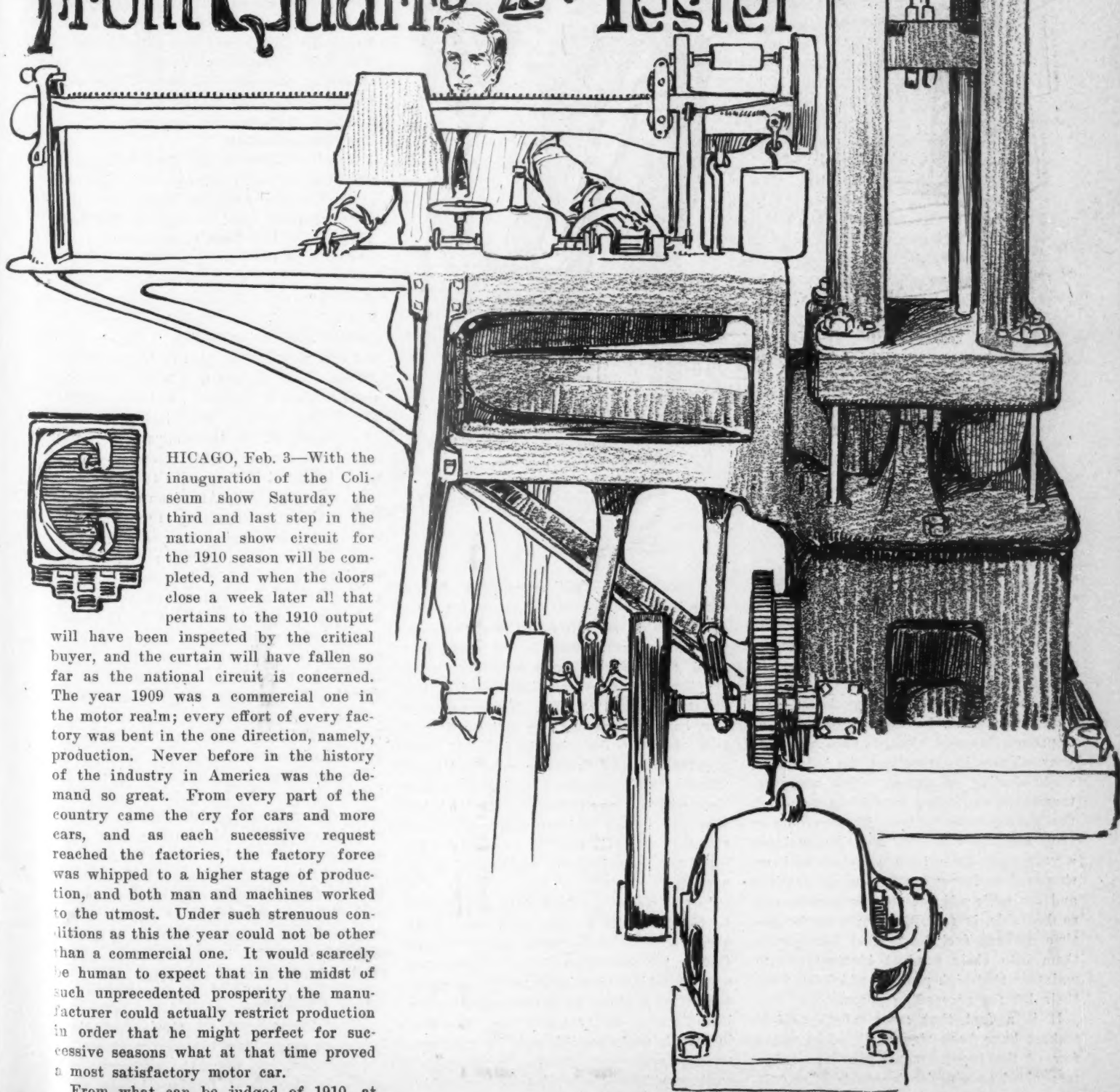


# MOTOR AGE

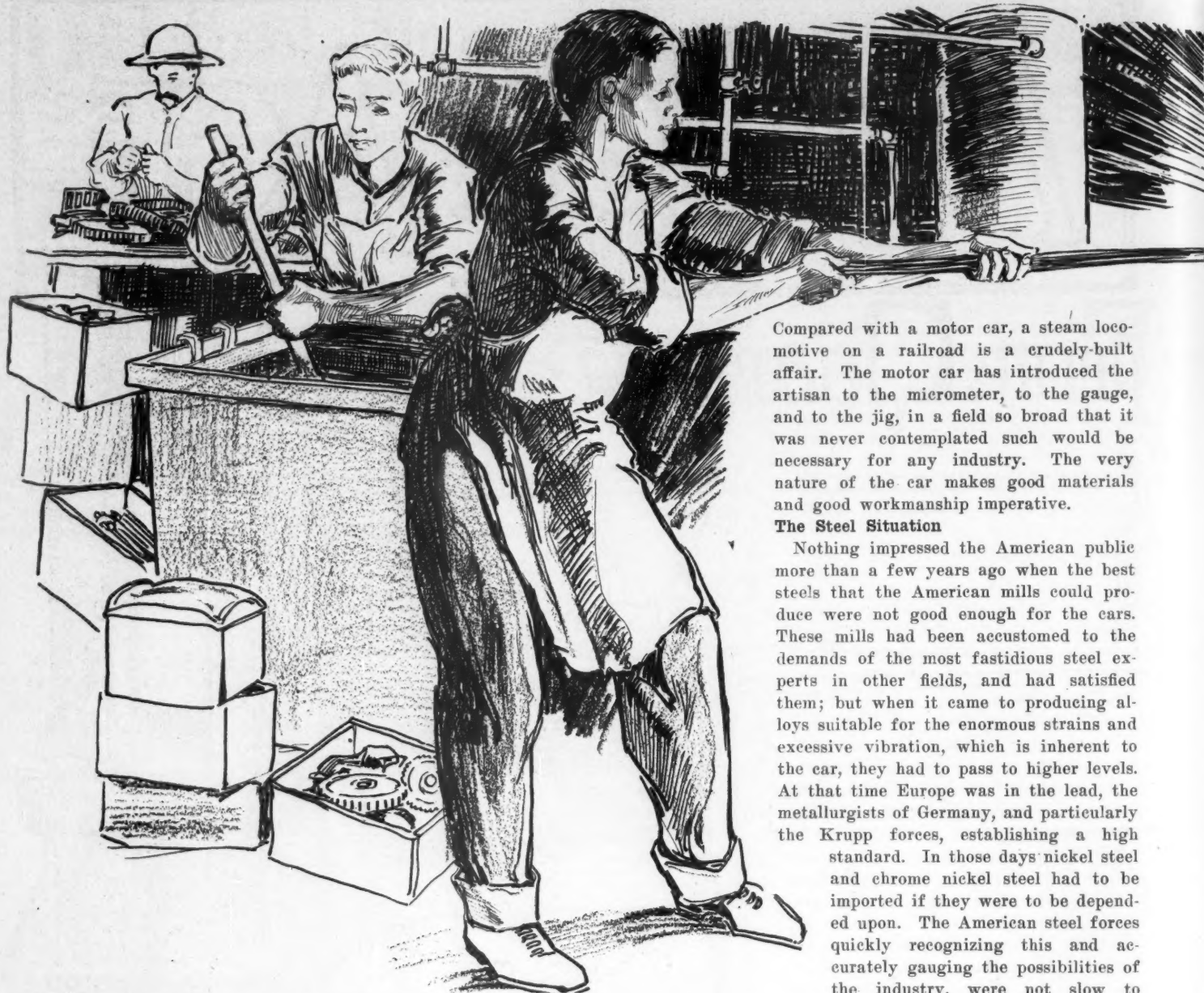
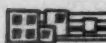
## From Quarry to Tester



CHICAGO, Feb. 3—With the inauguration of the Coliseum show Saturday the third and last step in the national show circuit for the 1910 season will be completed, and when the doors close a week later all that pertains to the 1910 output

will have been inspected by the critical buyer, and the curtain will have fallen so far as the national circuit is concerned. The year 1909 was a commercial one in the motor realm; every effort of every factory was bent in the one direction, namely, production. Never before in the history of the industry in America was the demand so great. From every part of the country came the cry for cars and more cars, and as each successive request reached the factories, the factory force was whipped to a higher stage of production, and both man and machines worked to the utmost. Under such strenuous conditions as this the year could not be other than a commercial one. It would scarcely be human to expect that in the midst of such unprecedented prosperity the manufacturer could actually restrict production in order that he might perfect for successive seasons what at that time proved a most satisfactory motor car.

From what can be judged of 1910, at



this early stage, the year augurs from a commercial viewpoint that production is travelling apace with last year, and in many factories, due to the increased facilities, the output for this season will double that of a year ago. In spite of this high production 1910 may be classed as a year which will be more productive of improvements and changes than was last year. There is throughout the industry a slight feeling of unrest. New manufacturers are exploiting new ideas at which the old spurned. These ideas, crude as they may have seemed to the engineer a year ago, have been polished and reshaped and now are considered feasible and desirable adjuncts to the present car, so desirable, in fact, that some of the old-time makers feel they must incorporate them into their product if they are to maintain that high position which has been their lot for succeeding years.

It is a fact that many of the oldest makers have been slowest to adopt not a few of the improvements that are today recognized as superior in construction. It

is harder for an old concern to change than it is for a new, but, thanks to the enterprise of not a few of the old makers, they have ever been on the alert, and from year to year have kept pace with the best that the inventive talent of the country has had to offer. Those concerns that have not pursued this policy will find that they are dropping behind and that eventually grand factories, excellent management and competent selling organizations will not save them from the landslide that will sooner or later follow that construction which is most in sympathy with the basic principles of mechanical engineering.

In the motor car field, from the quarry to the tester is a long span, and it is questionable if in any other field of manufacture the raw materials pass through so many machines, are inspected by so many experts and given as careful scrutiny as is the case with the motor car. The car, in fact, is made possible only by good materials, competent design, accuracy of workmanship and carefulness of assembly.

Compared with a motor car, a steam locomotive on a railroad is a crudely-built affair. The motor car has introduced the artisan to the micrometer, to the gauge, and to the jig, in a field so broad that it was never contemplated such would be necessary for any industry. The very nature of the car makes good materials and good workmanship imperative.

#### The Steel Situation

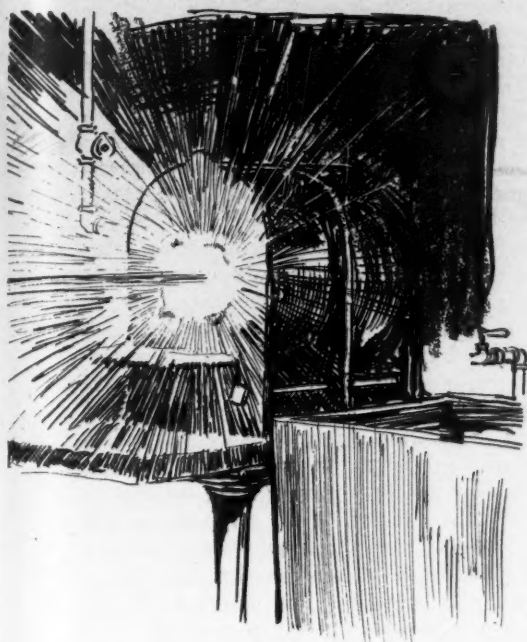
Nothing impressed the American public more than a few years ago when the best steels that the American mills could produce were not good enough for the cars. These mills had been accustomed to the demands of the most fastidious steel experts in other fields, and had satisfied them; but when it came to producing alloys suitable for the enormous strains and excessive vibration, which is inherent to the car, they had to pass to higher levels. At that time Europe was in the lead, the metallurgists of Germany, and particularly the Krupp forces, establishing a high standard. In those days nickel steel and chrome nickel steel had to be imported if they were to be depended upon. The American steel forces quickly recognizing this and accurately gauging the possibilities of the industry, were not slow to establish mills solely intended for the production of special steels for motor cars, a fact alone which made the development of the industry in the last couple of years at all possible. Without steels of the highest tensile strength and capable of withstanding the greatest fatigues, the motor car of today could not exist; it would not be a possibility, because steel is the basic factor in its construction.

The problem of steel has to date not been entirely solved. It is at present a many-cornered fight with chrome nickel, nickel, vanadium, high-carbon and the other grades of steel as the chief competitors. In low and medium-priced cars it is customary to use only carbon steels, with different percentages of carbon; however, some of the manufacturers of these cars have dabbled in the realm of alloy steels with more or less success.

#### Use of Forgings

With the advent of steel, and this brings us away from the quarry phase of the question, has come the enormous increase in the use of forgings in the car.





In the early days the tubular axle was general, but today it has been largely supplanted by the forged axle which is, in turn, giving away in several cases at the present time to the pressed steel construction. Not only has the forging played an important point in axle construction but it has usurped the entire field of gear construction. All of the gears in a motor car, with the exception of the timing gears of the motor and other slow-moving ones, are made from forged blanks, which have to pass through a long chain of operation before reduced to their state of finality and ready to take their place in the gearbox or rear axle.

Not alone has the forging usurped the field of gear construction but it has entered into a score of other roles in the chassis. In the matter of brackets it has largely supplanted the steel and other types of casting, and within the last couple of years it has been adopted fairly generally for motor and gearbox support in place of the aluminum support which found so much favor a few seasons ago. The possibility of forgings is absolutely unlimited and their advantages are numerous. In a motor car one important detail not to be overlooked is the conservation of space and the forging lends itself admirably to this condition. Wherever a forging can be used in a chassis not only is a stronger construction obtained but more space is left for other parts and the general simplicity of the chassis aided.

## Future of Forgings

It is a debatable point today what will be the future of the forging 2 or 3 years hence. Its coming rival is the stamping, which can be made in strength commensurate with the demands. It is lighter than the forging. It is immeasurably cheaper and is much quicker to manufacture. At one time the pressed steel frame was the sum-all of stampings in conjunction with a car. At that time the forging was the be-all and end-all of attraction and ex-

pensive car builders thought it was necessary to use forgings wherever they could be used and prided themselves on the enormous display of the varied forgings which entered into the car. This was excellent construction and a commendable policy to follow and would doubtless have been the undisputed arbiter of the situation today had it not been for that revolutionizer of the industry, namely, the low-priced, four-cylinder car. It was impossible to build a car for \$1,000, sell it at a profit and use many forgings. Makers in the \$1,500 and \$2,000 field faced a similar task, but what confronted all makers of low-priced cars and medium-priced cars as well, was the fact that they could not afford to turn out a cheap product because a cheap product is a terrifically expensive one in the end. These manufacturers soon realized that to build a cheap or medium-priced car they must build them in quantities and if they turned them out in 1,000 lots and any one part proved inadequate it would cost more to replace such imperfect parts and live down the reputation established thereby, than it would to study deeply into the cheap-car field and produce a satisfactory model.

## Stamping Problem Up

As a result of this state of affairs, the attention of manufacturers was turned to the great question: "How to build a satisfactory cheap car and sell it at a profit." This question brought the stamping problem to the foreground, and it further brought the great question of multiple manufacture to the attention of the makers. Another factor which has entered largely into the present method of high production is the development, and recognition as well, of the parts industry. A few years ago many manufacturers pointed with pride to the fact that they built every portion of their car with the exception of the electrical apparatus and the tires. They spoke of their steering gears as being superior to the stock-made products of other cars; they pointed with pride to the fact that their home-made radiator was far in advance of the best that the radiator makers could turn out; it was an equal satisfaction for them to pick out the carburetor of their own design and delineate its enormous merits as compared with that of the carburetor maker who turned out his goods by hundreds a day; they referred to their own particular rear-axle design, their own style of bearings; their own ignition characteristics; and, in fact, to a dozen other details, and in the words of the Pharisee "Were thankful their car was not as other cars were."

Today, this Pharisaic feeling has disappeared to a remarkable extent and the status of the part or accessory maker has been acknowledged by the car builder, many of whom now point with equal satisfaction to the stock-made radiator, which they realize is as well built as anything that can be purchased. Others who have seen the evils of their own carburetors have passed the part-

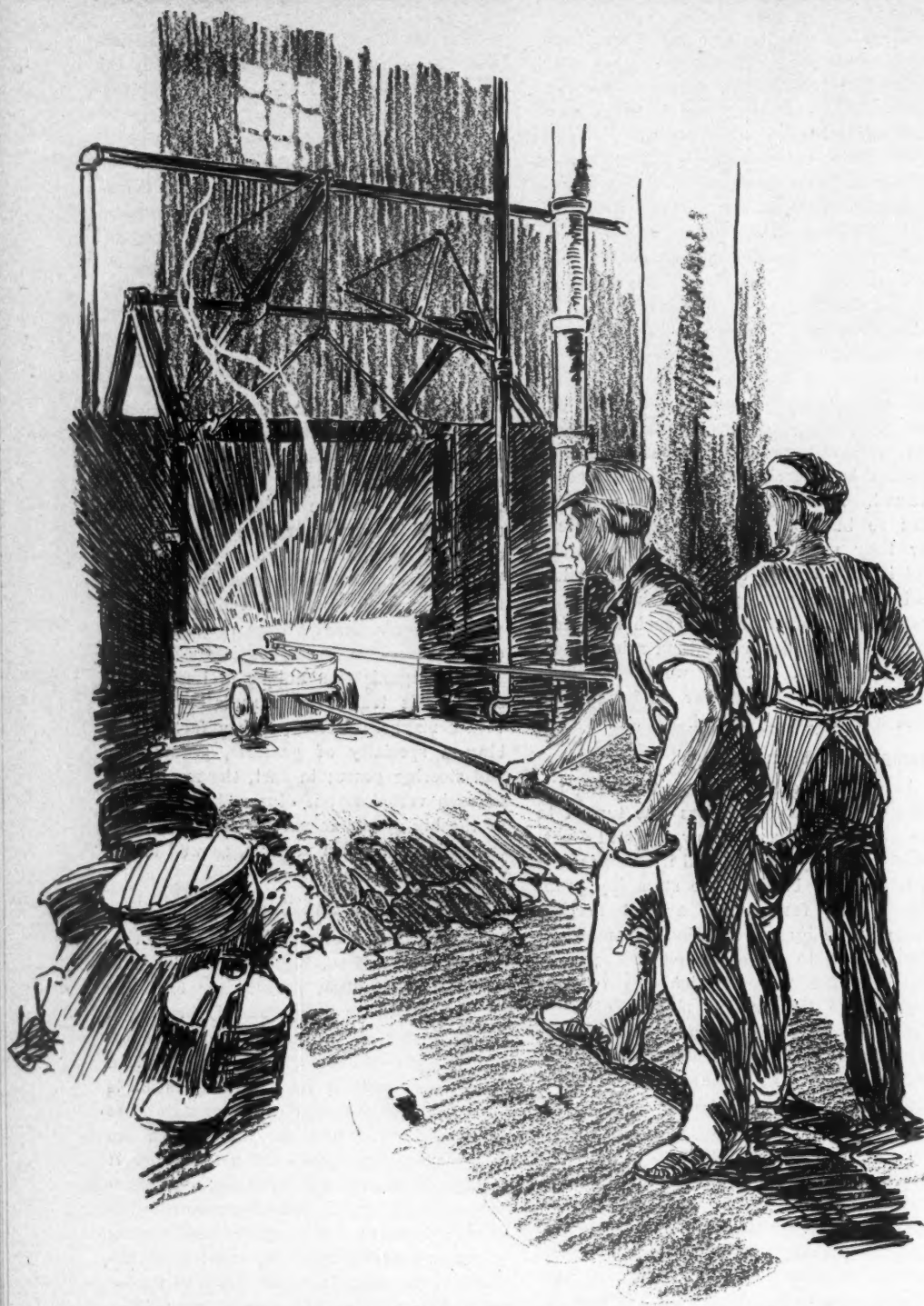
ing of the ways and now use a stock-made one. In practically all makes of cars it has been recognized that the bearing manufacturer, whether he produced ball or roller types, has made a closer study of this phase of the car than would be possible with the engineering staff of a factory, and so manufacturers have come to accept the stock-made bearing as the highest example of workmanship along this line.

The days are now over when peculiarities of ignition devices are continued by car makers. Confidence has been established in the various magneto manufacturers, so that today there are not more than one or two car builders who produce their own magnetos, whereas a couple of seasons ago not a few of them were worrying over designs of magnetos that they claimed were going to be revolutionizers in the ignition field. Delineation of this parts or accessory situation could be continued, but it is unnecessary. The greatest point in connection with it is that it has brought about a reduction in the price of cars. Makers have realized that a carburetor manufacturer requires a complete factory organization unique in itself. The same holds true with a radiator factory, with a magneto factory, with a factory making a specialty of gearsets, differentials and steering gears; in fact, the recognition of such varied manufacturers has been one of the big agents in making the present increase in production possible, as well as the reduction in prices.

## Aluminum Important Factor

The production of aluminum must be considered as one of the big factors which have played an important part in the evolution of the motor car today, and is proving a potent factor at the present time. Lightness is a pre-requisite of a car, in that if a machine is too heavy its cost of operation is too great. Aluminum, the feather metal, has done much to reduce car weight. In the early days many makers did not consider it strong enough for big crankcase and gearbox castings, but the manufacturers of different aluminum alloys with high tensile strength have brought the most intricate aluminum casting into the possibilities of the maker. During the present year, however, a slight turn in the aluminum situation has occurred, due to the high price of the metal. Some makers have resorted to cast iron for the crankcase, which, although it may add 150 or 160 pounds extra to the car, is not objected to, in that it has added in a place where extra weight can be carried to advantage. The aluminum regime has been somewhat molested by the introduction of bronze for crankcases and parts of gearboxes, the Locomobile company being one of the pioneers in this design, and which concern has many followers today, with the number constantly increasing.

Five years ago, when the use of aluminum was becoming general, few of the factories had their own foundries, being content to purchase everything from large aluminum houses, but during the last 2 years all of the first-class makers and a majority of the



second-class ones have established aluminum foundries of their own where they cast their crankcases, gearboxes, fan brackets, timer brackets, floor boards, steering wheel spiders, and whatever other parts this metal enters into in their car.

The establishment of the aluminum foundry at the car factory presents another phase of the quarry question of the motor car. It was considered 4 years ago poor policy to manufacture cylinder castings. At that time the foundry art was considered something foreign to the factory. Since then conditions have changed. Those who have followed the industry carefully and visited the different factories are familiar with the piles of defective cylinder castings which have been scrapped either because of flaws in the casting or for some other reason. The difficulty of obtaining quick and suit-

able redress in such conditions was a bother to the factory and was one cause why some of the factories began installing their own foundries for making cylinder castings. Some makers have continued to import cylinder castings on the ground that it is impossible to get certain grades of iron which are best suited for this work. On the contrary, other manufacturers with the cylinder-casting question close at heart have conducted analyses of the best foreign and domestic casting, with the result that they have decided that the American product is as good as the foreign. It is safe to assert that the importation of cylinder castings is not so great as it used to be, which is largely due to the development in the art and science of foundry practice in this country.

Six years ago it was considered a difficult

problem to make a single-cylinder casting with its integral waterjacket, and the percentage of good castings was very small. Today, after 5 years of experience and education, these same foundries are turning out castings containing as high as four cylinders and the upper half of the crankcase, and the percentage of failures is not nearly so high as it was in the days of the single-cylinder casting. This exemplifies the progress that has been made and augurs well for future possibilities in the casting field.

Leaving the material phase of the motor car and turning attention to the manufacturing processes, many reasons are found for the phenomenal development of the car as an engineering construction as well as the enormous increase in production. The jig has become the big equation in the factory situation. Today, on the cheap car as well as in the high-priced one, where quantity production is a consideration, the jig is the only solution. Not only has the jig made it possible for manufacturers to build cars in thousand lots and to put comparatively ignorant workmen at the production of intricate parts, but it has worked a marvelous good, the ramifications of which are endless. The jig has made interchangeability of parts a practical reality. Before it took possession of the factory a car owner in California was not certain whether he would get a new part that could be exactly fitted in the place of the broken member of his car. If it were a simple chassis bracket he was not certain whether the bolt hole was drilled in the correct place or not and whether, after waiting for the part, it could be used. With the jig this nightmare has passed. No matter how small the part or whether it has one hole for a bolt or six, where it has been manufactured by jig it is certain that it will fit every car of that model which has been turned out, whether it is owned in Maine, Louisiana, or North Dakota. To the owner, the jig has become a panacea and to the manufacturer it has been no less wonderful in its achievements.

#### Of Interest to Motorists

To the amateur motorist who may have never seen the inside of a factory it will suffice to state that the jig is a skeleton box into which a cylinder casting, let us say, has to be placed before the openings for the valve caps can be turned out, before the holes in the cylinder flanges by which it attaches to the crankcase are drilled, before the spark plug openings are drilled, and before a score of other things are done upon it. The cylinder casting can fit only one way in the jig. And in the steel sides of the jig are holes marking where each hole must be made in the casting, so that the machinist has not to measure the location of any hole that has to be drilled. His task is merely fitting the jig to his machine and bringing the drill or other machine into place, because there is only one place where it can work, and that is the right place. The jig is the salvation of the situation in more ways than one, and its multiplicity of usefulness is increasing daily. In the big fac-



tory the smallest part is placed in the jig, and when in a jig as many as eight or ten holes can be drilled in it at one operation.

After the jig in factory work comes the multiple machine, namely, that drill, or whatever machine it may be, which performs two, three, four, six, eight, ten or a dozen similar operations at once. An example of the multiple drill would be where the twelve openings for the valve tappets in a six-cylinder crank case are drilled at once. With a single drill this would mean twelve operations, and it would be understood that a crankcase would have to be moved eleven times in order to bring the part to be drilled in the proper position, making in all twenty-three operations. Today, this work is done with one movement of the crankcase and one drilling operation. The drill has twelve spindles with universal joints in the shafts, so that they can be set in any position and by bringing the twelve down at once twelve holes are drilled, in the same length of time it requires to drill one. Not only does the multiple drill save time, but, as stated, it more than decimates the number of factory operations.

## Some American Tools

The multiple machine is peculiarly an American development, and in it are found many of the reasons why American shop practice has eclipsed that of other countries and why the American takes the high stand he has in the machinery world. To the car manufacturer the multiple machine is the great money maker, in that it enables him to double and treble his output without increasing his factory force.

In the motor industry the multiple machine has been developed to an excellency never approached before. So great has been the demand for machinery of this nature that the highest class machinery houses have built to order special machines designed expressly for certain parts of different cars. Thus one maker has a milling machine made which will perform two or three operations at once, and which eliminates the necessity of moving the casting more than once and insures interchangeability. The end of this multiple-machine story is not yet, and so long as the great demand for motor cars continues, so long will our factory superintendents have to wrestle with the problem of labor-saving machines and so long will our machinery makers have to bend every effort and devote every energy to the making of these machines more automatic and more accurate from year to year.

Besides the jig and the multiple machine, the micrometer has been one of the instruments that have played a strong part in bringing motoring to its present status. The days were when a visitor could spend an entire day at a motor car factory and not see a micrometer, and in some of the cheaper factories today this is the case; but, where a real car is made, a car that has merit, a car that will endure, and a car that will give satisfaction, the micrometer must be present and present in goodly numbers.

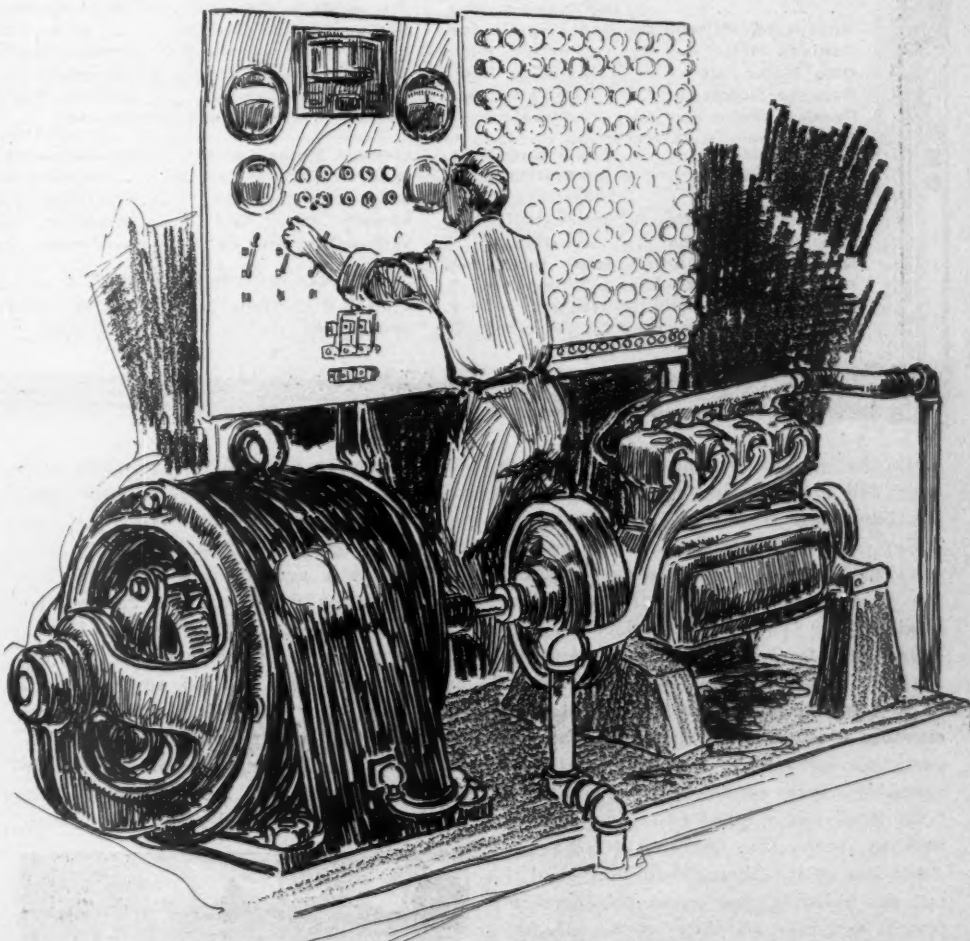
It may be urged that with the jig and the automatic machine that the human element is largely eliminated and the necessity of the micrometer eliminated. This is not the case. The finest tools wear, and when a tool wears the part which has been used to manufacture is changed. This change is so slight that it cannot possibly be detected with the eye. It cannot be detected with the ordinary measure, and it can only be detected with the micrometer. This suggests the necessity of micrometering shafts which are grounded, and crankshafts, bearings, camshaft, wristpins, etc. The micrometer, in the form of a surface gauge, is an absolute necessity in testing crankshafts, to determine if the length of the throws is uniform. The best heat-treated crankshafts obtained from the best forge companies and turned, machined and grounded on the best machines and under the watchfulness of the best superintendents will vary. It will be found that there will be a variation of as much as 10 and 12 thousandths, which would seriously impair the perfect compression in the four cylinders. Some manufacturers who have not been accustomed to measuring their crankshaft after purchasing them, have, when their attention was called to the matter, discovered as much as 1/32-inch more to the stroke of one piston than in another, and they have wondered why their motor did not give the best results. Conditions of this kind arise in practically every make of car and it is only the omni-presence of

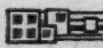
the micrometer or its equal that the manufacturer can be assured beyond the question of a doubt of the accuracy which he set out to maintain.

In the factories of today the inspection department is becoming more a reality than it was 2 years ago. When the words inspection department were suggested to certain makers they immediately replied, "Why, we use jigs and our machinery is so made that it is impossible to make the parts otherwise than accurate." Since then they have found the error of their ways, and the necessity of the inspection department has been magnified in their eyes. The inspection department is one of the cheapest in a factory. Some of our biggest factories employ an inspecting force of sixty or more, who work day in and day out, from Monday to Saturday, and from the first to the 31st of each month, and during every month of the manufacturing year, measuring with a micrometer, gauge, or other means, all parts manufactured and which are ready to take their place in the assembly of the motor, gearbox, axles, or other parts of the car chassis.

## Inspection Departments Necessary

Concerns with large inspection departments save money, in that when parts go from the finished stock room to the assembly floors they have not to be worked upon before they fit into their intended place. Some manufacturers have boasted of the excellent machinery equipment they fit on their assembly floor, so that any





# Coliseum Car and



## COLISEUM—MAIN FLOOR

American Locomotive Co.....New York  
 Apperson Brothers Auto Co.....Kokomo, Ind.  
 Babcock Electric Carriage Co.....Buffalo, N. Y.  
 Baker Motor Vehicle Co.....Cleveland, O.  
 Bartholomew Co.....Peoria, Ill.  
 Buick Motor Co.....Flint, Mich.  
 Cadillac Motor Car Co.....Detroit, Mich.  
 Chalmers-Detroit Motor Co.....Detroit, Mich.  
 Columbia Motor Car Co.....Hartford, Conn.  
 Corbin Motor Vehicle Corp.....New Britain, Conn.  
 Dayton Motor Car Co.....Dayton, O.  
 Elmore Mfg. Co.....Clyde, O.  
 Everitt-Metzger-Flanders Co.....Detroit, Mich.  
 Franklin, H. H., Mfg. Co.....Syracuse, N. Y.  
 Haynes Automobile Co.....Kokomo, Ind.  
 Hudson Motor Car Co.....Detroit, Mich.  
 Jeffery, T. B., & Co.....Kenosha, Wis.  
 Knox Automobile Co.....Springfield, Mass.  
 Locomobile Co. of America.....Bridgeport, Conn.  
 Lozier Motor Co.....New York  
 Maxwell-Briscoe Motor Co.....Tarrytown, N. Y.  
 Matheson Motor Car Co.....Wilkes-Barre, Pa.  
 Metzger Motor Car Co.....Detroit, Mich.  
 Midland Motor Co.....Moline, Ill.  
 Mitchell Motor Car Co.....Racine, Wis.  
 National Motor Vehicle Co.....Indianapolis, Ind.  
 Nordyke & Marmon Co.....Indianapolis, Ind.  
 Oakland Motor Car Co.....Pontiac, Mich.  
 Olds Motor Works.....Lansing, Mich.  
 Packard Motor Car Co.....Detroit, Mich.  
 Peerless Motor Car Co.....Cleveland, O.  
 Pennsylvania Auto-Motor Co.....Bryn Mawr, Pa.  
 Pierce-Arrow Motor Car Co.....Buffalo, N. Y.  
 Pope Mfg. Co.....Hartford, Conn.  
 Premier Motor Mfg. Co.....Indianapolis, Ind.  
 Reo Motor Car Co.....Lansing, Mich.  
 Ricketts Auto Works.....South Bend, Ind.  
 Royal Tourist Car Co.....Cleveland, O.  
 Selden Motor Vehicle Co.....Rochester, N. Y.  
 Stearns, F. B., Co.....Cleveland, O.

Stearns-Duryea Co.....Chicopee Falls, Mass.  
 Studebaker Automobile Co.....Chicago  
 Thomas, E. R., Motor Co.....Buffalo, N. Y.  
 Waverley Co.....Indianapolis, Ind.  
 Winton Motor Carriage Co.....Cleveland, O.  
 White Co.....Cleveland, O.  
 Woods Motor Vehicle Co.....Chicago, Ill.

## FIRST REGIMENT ARMORY—MAIN FLOOR

American Motor Car Co.....Indianapolis, Ind.  
 Atlas Motor Car Co.....Springfield, Mass.  
 Auburn Automobile Co.....Auburn, Ind.  
 Austin Automobile Co.....Grand Rapids, Mich.  
 Berliet Import Co.....Chicago, Ill.  
 Brush Runabout Co.....Detroit, Mich.  
 Buckeye Mfg. Co.....Anderson, Ind.  
 Cartercar Co.....Pontiac, Mich.  
 Chadwick Engineering Works.....Pottstown, Pa.  
 Dorris Motor Car Co.....St. Louis, Mo.  
 Fiat Automobile Co.....New York  
 Holman Automobile Co.....Chicago, Ill.  
 Hupp Motor Car Co.....Detroit, Mich.  
 Jackson Automobile Co.....Jackson, Mich.  
 Kimball, C. P., & Co.....Chicago, Ill.  
 McIntyre, W. H., Co.....Auburn, Ind.  
 Moline Automobile Co.....East Moline, Ill.  
 Moon Motor Car Co.....St. Louis, Mo.  
 Mora Motor Car Co.....Newark, N. Y.  
 Ohio Motor Car Co.....So. Cincinnati, O.  
 Palais de l'Automobile.....New York  
 Pierce Motor Co.....Racine, Wis.  
 Pullman Motor Car Co.....York, Pa.  
 Rapid Motor Vehicle Co.....Pontiac, Mich.  
 Rauch & Lang Carriage Co.....Cleveland, O.  
 Regal Motor Car Co.....Detroit, Mich.  
 Renault Freres Selling Branch, Inc.....New York  
 Simplex Motor Car Co.....Mishawaka, Ind.  
 Speedwell Motor Car Co.....Dayton, O.  
 Staver Carriage Co.....Chicago, Ill.  
 Streater Motor Car Co.....Streator, Ill.  
 Willys-Overland Co.....Toledo, O.

## COLISEUM BASEMENT

Anderson Carriage Co.....Detroit, Mich.  
 Black Mfg. Co.....Chicago, Ill.

Cameron Car Co.....Beverly, Mass.  
 Clark Carriage Co., A. C.....Chicago, Ill.  
 Diamond T Motor Co.....Chicago, Ill.  
 Elkhart Motor Car Co.....Elkhart, Ind.  
 Fal Motor Co.....Chicago, Ill.  
 Fuller Buggy Co.....Jackson, Mich.  
 Grabowsky Power Wagon Co.....Detroit, Mich.  
 Gramm-Logan Motor Car Co.....Bowling Green, O.  
 Great Western Auto. Co.....Peru, Ind.  
 Henderson Motor Sales Co.....Indianapolis, Ind.  
 Inter-State Automobile Co.....Muncie, Ind.  
 Kissel Motor Car Co.....Hartford, Wis.  
 Lexington Motor Car Co, Inc.....Lexington, Ky.  
 Lion Motor Car Co.....Adrian, Mich.  
 Metz Co.....Waltham, Mass.  
 Monitor Auto Works.....Chicago, Ill.  
 Rider-Lewis Motor Car Co.....Anderson, Ind.  
 Schacht Mfg. Co.....Cincinnati, O.  
 Springfield Motor Car Co.....Springfield, Ill.  
 Wayne Works.....Richmond, Ind.  
 Zimmerman Mfg. Co.....Auburn, Ind.

## COLISEUM GALLERY AND ANNEX

Ajax-Grieb Rubber Co.....New York  
 American Electric Novelty and Mfg. Co.....New York  
 Atwater Kent Mfg. Works.....Philadelphia, Pa.  
 Auburn Auto Pump Co.....Auburn, N. Y.  
 Aurora Automatic Machinery Co.....Aurora, Ill.  
 Auto Improvement Co.....New York  
 Auto Parts Mfg. Co.....Muncie, Ind.  
 Badger Brass Mfg. Co.....Kenosha, Wis.  
 Baldwin Chain and Mfg. Co.....Worcester, Mass.  
 Batavia Rubber Co.....Batavia, N. Y.  
 Bowser, S. F., & Co., Inc.....Fort Wayne, Ind.  
 Breeze Carbureter Co.....Newark, N. J.  
 Briggs & Stratton.....Milwaukee, Wis.  
 Brown-Lipe Gear Co.....Syracuse, N. Y.  
 Bryne-Kingston & Co.....Kokomo, Ind.

work that has to be done on parts before they will assemble properly can be done on these machines. This is short-sighted policy. No part entering into the makeup of any car should ever be checked into the finished stock room until it is absolutely ready to take its place in any chassis of the model for which it is intended. Supposing that such a part were in the stock room and not sufficiently accurately finished to do this, and that this part, instead of finding its way into the assembly room at the factory is taken from stock and shipped to Dallas, Tex., to take the place of a broken part in a car. At Dallas no machinery shop is at hand to put the finishing touches on this part before it can take its place in the car, and

in nine cases out of ten the car owner will be highly disgusted with the situation and his confidence in the manufacturer of the car will be greatly shattered.

Again, it is not amiss to reiterate that the inspection department is one of the cheap departments of the factory, if not the cheapest. If all the factories were efficiently equipped in this respect there would be fewer complaints from all sections of the country regarding the difficulty of fitting spare parts to their cars. In addition to being cheap in this respect, the inspection department is cheap



in that it saves time in the assembling room. If a part goes to the assembling room it should be ready without any work being done upon it to take its place in the car. If not, it should be returned to the department in which it was made. Some parts have to go through half a dozen operations and pass into half a dozen departments, so that there would be the long journey through all of these to discover in which the error occurred. Where a good inspection department is furnished, each part is inspected after each operation. Some parts have as high as twenty distinct operations and should be inspected after each, making twenty inspections in all. The reason for this is apparent. Supposing in the first opera-



# Accessory Exhibitors

Connecticut Telephone and Electric Co. Meriden, Conn.  
Continental Caoutchouc Co. New York  
Continental Motor Mfg. Co. Muskegon, Mich.  
Consolidated Rubber Tire Co. New York  
Cook, Adam, Sons. New York  
Cook's Standard Tool Co. Kalamazoo, Mich.  
Cowles, C., & Co. New Haven, Conn.  
Cramp, Wm., & Sons. Philadelphia, Pa.  
Dayton Rubber Mfg. Co. Dayton, O.  
Diamond Chain and Mfg. Co. Indianapolis, Ind.  
Diamond Rubber Co. Akron, O.  
Dietz, R. E., Co. New York  
Dixon, Joseph, Crucible Co. Jersey City, N. J.  
Duff Mfg. Co. Pittsburg, Pa.  
Edmunds & Jones Mfg. Co. Detroit, Mich.  
Electric Storage Battery Co. Philadelphia, Pa.  
Empire Tire Co. Trenton, N. J.  
Excelsior Motor and Mfg. Co. Chicago, Ill.  
Federal Rubber Co. Trenton, N. J.  
Firestone Tire & Rubber Co. Akron, O.  
Fisk Rubber Co. Chicopee Falls, Mass.  
Fox Metallic Tire Belt Co. 15 Murray St., New York  
Gabriel Horn Mfg. Co. Cleveland, O.  
G & J Tire Co. Indianapolis, Ind.  
Gemmer Mfg. Co. Detroit, Mich.  
Gilbert Mfg. Co. New Haven, Conn.  
Globe Machine and Stamping Co. Cleveland, O.  
Goodrich, B. F., Co. Akron, O.  
Goodyear Tire and Rubber Co. Akron, O.  
Gray & Davis. Amesbury, Mass.  
Ham, C. T., Mfg. Co. Rochester, N. Y.  
Hancock Mfg. Co. Charlotte, Mich.  
Hardy, R. E., Co. New York  
Harris, A. W., Oil Co. Providence, R. I.  
Hartford Rubber Works Co. Hartford, Conn.  
Hartford Suspension Co. Jersey City, N. J.  
Havoline Oil Co. New York  
Hayes Mfg. Co. Detroit, Mich.  
Heinze Electric Co. Lowell, Mass.  
Herz & Co. New York  
Holley Brothers Co. Detroit, Mich.  
Imperial Brass Mfg. Co. Chicago, Ill.  
Jones Speedometer Co. New York  
Kokomo Electric Co. Kokomo, Ind.  
Leather Tire Goods Co. Newton Upper Falls, Mass.  
Link-Belt Co. Philadelphia, Pa.  
Long Mfg. Co. Chicago, Ill.

Lovell-McConnell Mfg. Co. Newark, N. J.  
McCord Mfg. Co. Detroit, Mich.  
Mezger, C. A. New York  
Michelin Tire Co. Milltown, N. J.  
Morgan & Wright. Detroit, Mich.  
Mosier, A. R., & Co. New York  
Motsinger Device Mfg. Co. Pendleton, Ind.  
Motz Clincher Tire and Rubber Co. Akron, O.  
Muncie Gear Works. Muncie, Ind.  
National Carbon Co. Cleveland, O.  
National Coil Co. Lansing, Mich.  
Never-Miss Spark Plug Co. Lansing, Mich.  
Norton Company. Worcester, Mass.  
N. Y. and N. J. Lubricants Co. New York  
Oliver Mfg. Co. Chicago, Ill.  
Pantastote Co. New York  
Pittsfield Spark Coil Co. Pittsfield, Mass.  
Pennsylvania Rubber Co. Jeannette, Pa.  
Randall-Falchney Co. Boston, Mass.  
Rands Mfg. Co. Detroit, Mich.  
Remy Electric Co. Anderson, Ind.  
Republic Rubber Co. Youngstown, O.  
Ross Gear and Tool Co. Lafayette, Ind.  
Royal Equipment Co. Bridgeport, Conn.  
Sager, J. H., Co. Rochester, N. Y.  
Shaler, C. A., Co. Waupun, Wis.  
Smith, A. O., Co. Milwaukee, Wis.  
Spicer Universal Joint Mfg. Co. Plainfield, N. J.  
Splittdorf, C. F. New York  
Sprague Umbrella Co. Norwalk, O.  
Standard Roller Bearing Co. Philadelphia, Pa.  
Standard Welding Co. Cleveland, O.  
Stewart & Clark Mfg. Co. Chicago, Ill.  
Stromberg Motor Devices Mfg. Co. Chicago, Ill.  
Swinehart Clincher Tire and Rubber Co. Akron, O.  
Thermoid Rubber Co. Trenton, N. J.  
Timken-Detroit Axle Co. Detroit, Mich.  
Timken Roller Bearing Co. Canton, O.  
Turner Brass Works. Sycamore, Ill.  
United Manufacturers. New York  
U. S. Light and Heating Co. New York  
Valentine & Co. New York  
Veeder Mfg. Co. Hartford, Conn.  
Vesta Accumulator Co. Chicago, Ill.  
Warner Gear Co. Muncie, Ind.  
Warner Instrument Co. Beloit, Wis.  
Weed Chain Tire Grip Co. New York  
Warner Mfg. Co. Toledo, O.  
Wheeler & Schebler. Indianapolis, Ind.  
Whiteley Steel Co. Muncie, Ind.  
Whitney Mfg. Co. Hartford, Conn.  
Witherbee Igniter Co. New York

## COLISEUM GALLERY AND ANNEX—SECOND FLOOR

American Motor Co. Brockton, Mass.  
Consolidated Mfg. Co. Toledo, O.  
Excelsior Supply Co. Chicago, Ill.  
Greyhound Motor Works. Buffalo, N. Y.  
Harley-Davidson Motor Co. Milwaukee, Wis.  
Hendee Mfg. Co. Springfield, Mass.  
Hornecker Motor Mfg. Co. Geneseo, Ill.  
Merkel Light Motor Co. Pottstown, Pa.  
New Era Auto Cycle Co. Dayton, O.  
Pierce Cycle Co. Buffalo, N. Y.  
Pittsfield Spark Coil Co. Pittsfield, Mass.  
Reading Standard Co. Reading, Pa.  
Reliance Motor Cycle Co. Owego, N. Y.

## FIRST REGIMENT ARMORY—GALLERY

Ajax Trunk and Sample Case Co. New York  
Apple Electric Co. Dayton, O.  
Benford, E. M. Mount Vernon, N. Y.  
Breakstone, S. Chicago, Ill.  
Chicago Wind Shield Co. Chicago, Ill.  
Detroit Motor Car Supply Co. Detroit, Mich.  
Driggs-Seabury Ordnance Corp. Sharon, Pa.  
Elite Mfg. Co. Ashland, O.  
Excelsior Supply Co. Chicago, Ill.  
Fellwock Auto and Mfg. Co. Evansville, Ind.  
Flentje, Ernst. Cambridge, Mass.  
Franklin, H. H., Mfg. Co. Syracuse, N. Y.  
Fulton-Zinke Co. Chicago, Ill.  
Garage Equipment Co. Milwaukee, Wis.  
Gasoline Motor Efficiency Co. Jersey City, N. J.  
Gates-Osborn Mfg. Co. Marshalltown, Ia.  
High Frequency Ignition Co. Los Angeles, Cal.  
Lavalette & Co. New York  
Mesinger, H. & F., Mfg. Co. New York  
Morrison-Ricker Mfg. Co. Grinnell, Ia.  
Motor Parts Co. Plainfield, N. J.  
Motor Specialty Co. Detroit, Mich.  
Overland Sales Co. Chicago, Ill.  
Perfection Spring Co. Cleveland, O.  
Point Spark Plug Co. Aberdeen, S. D.  
Standard Auto Supply Co. Chicago, Ill.  
Standard Varnish Works. Chicago, Ill.  
Triple Action Spring Co. Chicago, Ill.  
Troy Carriage Sunshade Co. Troy, O.  
20th Century Motor Car Supply Co. South Bend, Ind.  
Universal Tire Protector Co. Angola, Ind.  
Vanguard Mfg. Co. Joliet, Ill.  
Vehicle Top and Supply Co. St. Louis, Mo.

tion the work is overdone, the part is too small, and rendered useless. Why waste time putting it through twenty more operations, knowing that in the end the piece will be rejected. It is enough to lose the part in the raw state or after one operation has been performed, but it is much more expensive to have to pay for twenty operations only to lose it in the end.

### Inspector Maintains Efficiency

There is another phase to this inspection work. It keeps the workmen up to 100 per cent efficiency. If a workman knows that each piece is inspected after it goes out of his hands, and if he knows that if an error is made the factory superintendent knows at once that he made it, that workman will work with greater care

and accuracy than in the factory where he knows there is no such minute inspection and where any errors of his will be entered on the loss-and-gain account.

Lastly, after the problems of raw material and workmanship thereon have been decided, and the car has been built, comes the final testing which is a most important part in cars of today and one which is being neglected by not a few manufacturers. It is criminal for a maker to ship his car from the factory unless it is tuned and in running condition. Cars have been shipped from factories in which the needle



valve in the carburetor was too long to permit of the normal workings of the carburetor; others have been shipped in which the core sand was not all removed from the waterjackets; in fact, some managers of salesrooms have stated that they never did receive a car from the factory which they expected to run well without first having been tuned up and put in shape by them. This is a great mistake and will prove a dollar-and-cent loss to the maker. How can a car be expected to perform well if it doesn't leave the factory in running shape. In the majority of cases this is not due to inefficiency on the part of testers, but rather to carelessness and lack of organization with many of the manufacturers.

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# MOTOR AGE

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## Silver Lining To the Motor Cloud

IF you are a car manufacturer, stand firm; if you are an accessory maker, stand pat; if you are a sales-manager, have confidence; if you are a branch manager, a dealer or a salesman, believe in your business and be sanguine. The bottom in the motor car industry is more solid today than ever before. Some people think and have thought for the last half year that the bottom is getting thin, that the solder is melting and running away and that in 6 months there will not be much left. Such people are pessimists—those people who see only the shadows and who have not harmonized themselves with or entered into the deep, broad, earnest spirit of the industry. Pessimists have existed in all ages; the exact role the Creator intended them to play has not been very clearly decipherable, but for some reason they are with us and must remain. Pessimists are not the makers of history; they are not the great forces that turn the wheels of progress and development. When the history of the twentieth century is written, the evolution of the motor car and the unfolding of the motor industry will stand out as a star that burns with a clear flame and not as a twinkling planet of a fifth or lower order.

WHATEVER is rational endures: Motoring is a rational industry. It has to do with the shortening of man's labors; it is concerned with cementing closer fraternal relationships between our citizens in the city and those in the country; it busies itself in supplanting the horse in those fields of toil where the poor equine never was intended; it is a vital factor in the sanitary conditions of the streets of great metropolitan centers; it is daily reducing the street noise in big cities and solving the problems of traffic congestion; it is taking its place in getting the business man away from the business center where his mind is centered and getting him to the country where he can rejuvenate himself for another day; and, in fact, the motor car is working wonders and its ramifications are endless.

OF late there have been those who say the industry must not be allowed to expand too rapidly, that the number of new concerns entering the market must be curbed, that the production must be limited, that the supply never must be allowed to exceed the demand, and that, in short, the lines must be drawn closely on the newcomers. This is good logic providing the controller aims to control and not to manacle the industry. Every legitimate maker in the country should unite with every other legitimate maker who

builds good machines and sells them at sane prices to stop every other maker who is an impostor—placing inferior cars on the market, which are painted as lustreously as the good but which under the body are without merit, design or materials; but every legitimate maker should unite with every other legitimate maker to protect that newcomer who is in sympathy with the industry and who is conscientiously building cars that are good cars, whether this newcomer started last July or January 1. The bad must be curbed, the good assisted, and it is up to the spirits of the industry to marshal the forces, direct the campaign and administer the punishments or rewards.

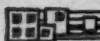
THE motor car today typifies the highest in transportation, and transportation is rational. Transportation decimates labor by multiplying man's working abilities and lengthening his hours. Whatever saves time inevitably must take its place as one of the great agents which is rolling this world, with all its master problems, on to the ultimate goal of perfect achievement. That man has not been born who can stop progress; he may impede it for a time, but as surely as day succeeds night, so surely must he be overcome by the master forces of progress. It were as well for human man to try to stop advancement as to stand on the beach and command the waves to recede.

THERE is a natural law which says that useful plants in the vegetable kingdom crowd out and kill the less useful plants and weeds. Nature never was a spendthrift, and only those growths live that are of value. So it is in the motor sphere; those designs which have merit will live and those that have not sooner or later will find themselves castaways, lost and side-tracked in the hot heat of present-day achievement. Those designers who have built upon sand only will reap a harvest of barren regrets; but those who have studied, toiled and researched, who have delved deep and long into the vast depths of engineering, will find the rock and will rear thereon structures that cannot be overthrown, edifices against which the shafts of criticism will count for naught and which works will take a permanent place in the evolution of the industry. More Gottlieb Daimlers and not so many imitators are needed today. Our designers should spend more time in the laboratory and less in touring the factories of Europe. There is no reason why we should have to lean on a borrowed staff. America has enough pure air, enough pure food, enough colleges, enough professors, enough laboratories and energies to crowd Europe off the motoring map.





KING STILL!



**I**N CONNECTION with the Grand Central palace and Madison Square garden shows, held recently in New York, Motor Age published a complete review of the four average cars at each show, that is, the \$1,000 car, the \$1,500 car, the \$2,500 machine, and the \$4,000 product. This week is given herewith an analysis of additional cars which will be exhibited at the Chicago Coliseum show, the cars referred to in this article being entirely different from those referred to in the two previous accounts. It follows from this that the analysis given herewith does not apply specially to the cars exhibited at Chicago in particular, but to those cars seen at Chicago which have not been previously exhibited, as well as to a score or more of other cars which are being shown at not a few of the local exhibitions in cities all over the country. As was done at the New York shows, so here, the motors being divided into four classes, namely, those in \$1,000, \$1,500, \$2,500 and \$4,000 classes. The percentages which follow are compiled from definite data collected on all the different car makes.

#### Comparisons are Made

Roughly speaking, this third division of cars, which for convenience will be called the Chicago division, compares fairly closely with divisions one and two, namely, those of the New York palace and garden shows. In a brief consideration of the \$1,000 Chicago-show car it is a 21.6-horsepower machine, this figure being considerably in advance of 17.2 horsepower for the palace show and but slightly under 22.5 horsepower at the licensed show. This car has a cylinder bore of 4.17 inches, a stroke of 4.25 inches and a piston displacement of 170.7 cubic inches. These figures show this motor to be of the semi-long-stroke variety, and it is quite remarkable that the cylinder bore is the same as that of the \$1,500 car in the licensed association show, and much greater than that of the \$1,000 car in the recent palace exposition.

In the matter of casting cylinders it is



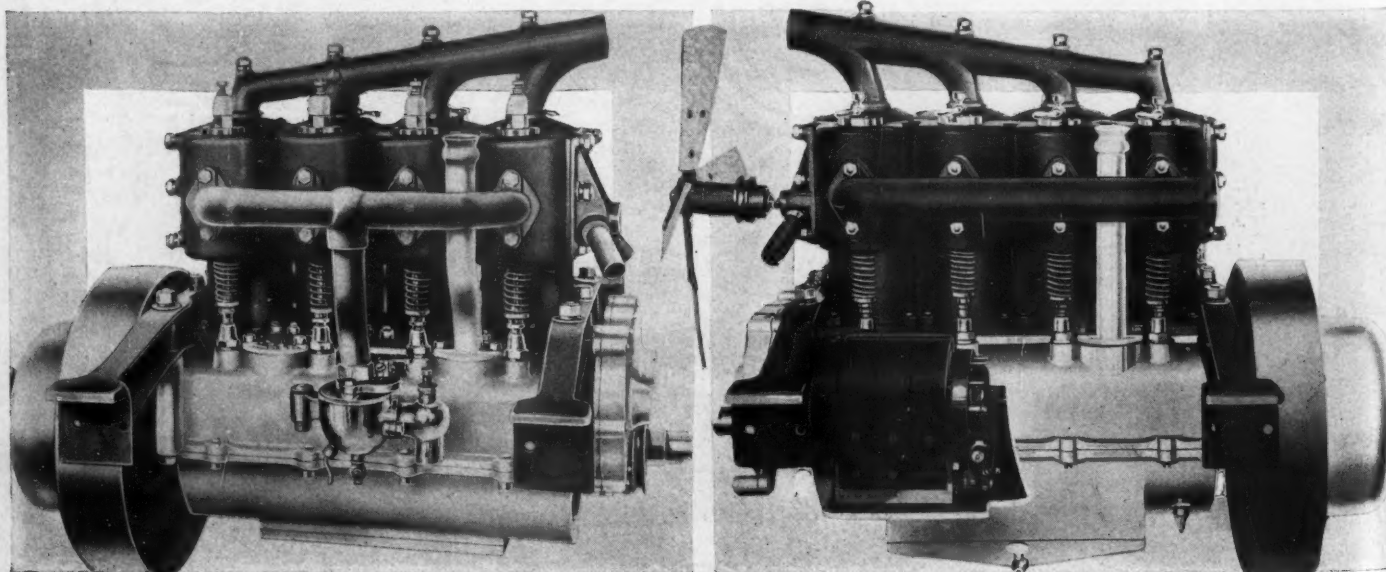
quite surprising to note that the two-cylinder car is in the lead with 66.7 per cent, and the remainder being credited to the four-cylinder type. The rule, already inferred from a previous analysis, is maintained in this class in the matter of cylinder type, the L design being everywhere in the lead. It is also worthy of note that the separately-cast cylinder has 66 per cent of the following and the en bloc 33, there being scarcely an example of cylinders cast in pairs. Thermo-syphon cooling is away in the lead, more than two-thirds of these makers using it, and the remainder divided evenly between pump circulation and air-coolers.

In the ignition field there is not an example of combination ignition, the high-tension single system being everywhere in use. Gravity gasoline feed has 100 per cent of the followers. There is quite a division in the lubricating field in this \$1,000 car, 33 1/3 per cent using the circulating pump system, a similar number the mechanical oiler, and the remainder divided evenly between a flywheel circulating system and a gravity feed.

Passing hastily along to the transmission system, the clutch field is divided solely between the multiple-disk and cone adherents, there not being a single example of the internal or external band types. In the gearset field one-third use the planetary set, and the remainder the sliding-gear design, with 50 per cent of the followers using the progressive set, and 16 per cent operated selectively. Shaft drive has 83 per cent.

The transition in design and size from the \$1,000 to the \$1,500 car is the same in this Chicago division as it was in the two previous New York ones. There is, in brief, noted a pronounced tendency to the four-cylinder motor. The L type of cylinder remains in the ascendancy, the method of casting cylinders in pairs gains rapidly, the circulating water system deposes the thermo-syphon from its premier position, dual and double ignitions begin sharing the field with the single system, the circulating system of oiling has more followers than all of the other systems combined, the selective gearset makes noted advances, and shaft-drive is a big gainer.

The \$1,500 car of the Chicago show is, according to A. L. A. M. figures, a higher-powered vehicle than at either the palace or garden. It has a rating of 27.4 horsepower, as compared with 26.6 at the palace show and 27.3 at the licensed show. Its average bore is 4.26 inches, and its stroke 4.57 inches, and has a piston displacement of 243.2 cubic inches. Right here it is well to interject that a great many of the cars covered in this classification are new machines, having been brought out during the past autumn, and it is quite natural that many of these makers have felt that, in order to successfully introduce and market their cars, they must give more horsepower, or, in other words, more car for the money. This doubtless, to a large extent at least, answers why the average car in the four Chicago classes is larger than the average car shown at the two New York exhibitions. With many of the



INTAKE AND EXHAUST SIDES OF BLACK MOTOR IN WHICH T TYPE CYLINDERS ARE BOLTED TOGETHER TO FORM A CONTINUOUS WATERJACKET



## Motor Review

old-time makers there has been no increase in bore or stroke in the last year or so, but these concerns have been increasing their power by refinement of construction and numerous changes in valve, cam and piston designing.

### L Type Cylinders Popular

Passing to the type of cylinder casting used, the reader will expect the L type to rule in view of the fact that it is cheaper to manufacture than the T-head design. This is the case, and the L type has 71.5 per cent of the followers; 19 per cent use valve-in-the-head motors, and 9.5 per cent the T-head design. It will be at once noticed that the T-head motor is more expensive to manufacture and is generally found in high-priced cars, namely, the \$4,000 class. The reason of its greater expense to manufacture is partly explained by the fact that it requires two camshafts, the extra gears to drive these, a more complex crankcase, etc.

It is surprising to note that 47.7 per cent of makers of this \$1,500 car use separately-cast cylinders; 38 per cent cast the cylinders in pairs, and 14.3 use the en bloc design. These figures show that the percentage of en bloc motors is twice as great in the \$1,000 cars as in the \$1,500, and that this type of construction is not met with in the \$2,500 or \$4,000 car. Ninety and five-tenths per cent of these makers use the four-cylinder motor, the remainder employ the two, figures which show beyond a question of doubt the great popularity of the four-cylinder motor and the absolute elimination of the single-cylinder type.

This \$1,500 car brings us to the turning of the ways in water circulation. Builders of \$1,000 cars are believers in thermo-syphon cooling, but as soon as you come to the \$1,500 class, or larger, the pump circulation takes the lead. This has been the case in all three divisions of this motor analysis. On this third division 66.7 per cent cool by the circulating-pump system, 28.5 per cent by thermo-syphon circulation and 4.8 per cent use air cooling.

### The Matter of Ignition

In the matter of ignition on the \$1,500 car Motor Age once again comes to the turning of the ways, and finds that when makers ask this price for a car they are prepared to give a dual magneto system, and some go as far as to give a complete double outfit, with two sets of spark plugs. None of the makers fits low-tension make-and-break schemes; in fact, there is not an example of the make-and-break arrangement at the Chicago division of American motors. The single-high-tension has over half of the followers, to be exact 52.5 per cent; 28.5 per cent fit the magneto-dual outfit, and a surprisingly large number, namely, 19 per cent, provide double systems. A brief glance in passing at the lubricating of this car shows the rapid onward march of the circulating system, 66.7 per cent being devotees of this. Of the remainder 24 per cent use the mechanical oiler, and what are left are divided evenly between the flywheel-circulating system and the compression oiler. So far in this Chicago division all manufacturers use gravity feed to the carbureter.

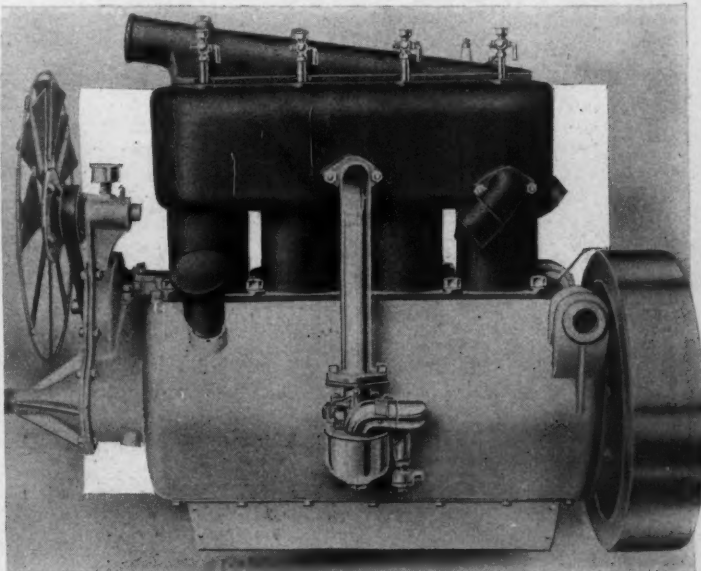
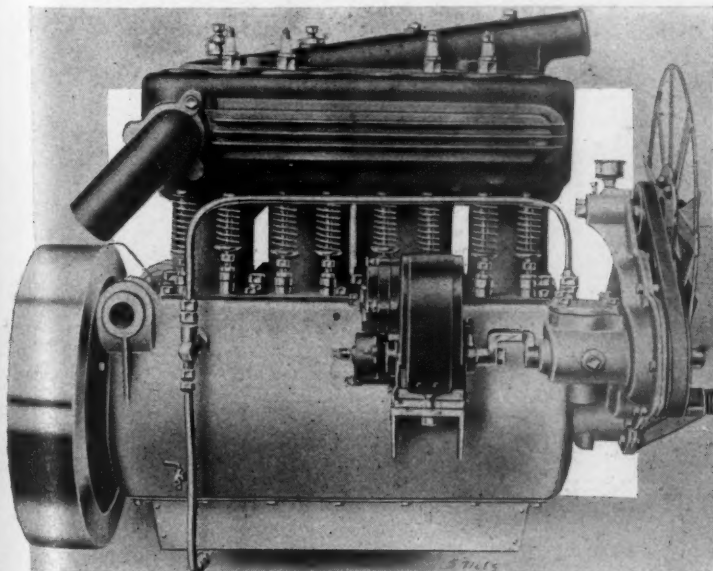
The expected trends in the transmission appear in this car. The cone clutch, with 63 per cent of the followers, has the multiple-disk as its sole competitor. This condition was true in the garden show, although in that case these figures were exactly reversed, the multiple-disk being the leader. In the palace show the cone clutch was the leader and the internal band had a few followers.

The gearset situation shows 65 per cent users of the selective set, 15 per cent using the progressive, and 20 per cent the planetary system. These figures show that, in the ascending scale of prices there is a general gain for the selective and a loss for the planetary. Ninety per cent of the cars in this division use shaft drive.

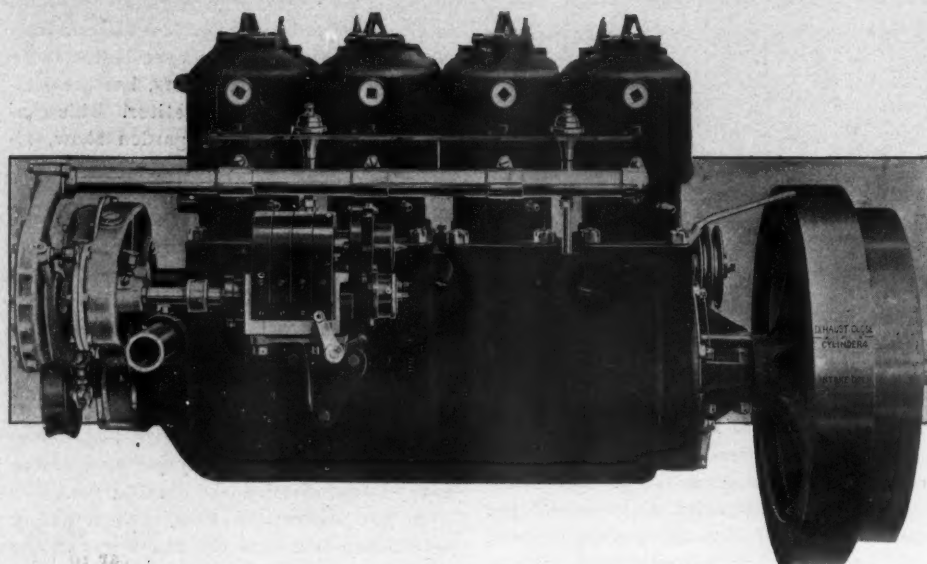
In the matter of wheelbase it is an astounding fact that the \$1,500 car in the palace show, at the garden show, and in the Chicago division has a 109-inch wheelbase in every case. The tire situation is not so uniform. At the garden the average size for front and rear was 34 inches, at the palace it was 33.6 inches, and in this Chicago analysis it is 32.9 inches. In all three shows the trend of using larger-diameter tires and fitting larger wheels is everywhere apparent.

The Chicago division \$2,500 car offers more interesting phases of comparison. This car has 116-inch wheelbase, as compared with 112 at the garden and 114 at the palace, facts which doubtless can be translated into that of the new maker giving more car for the same money. In the tire situation of this car it is an even run among the palace, garden and Chicago divisions, all fitting 34 and a fraction inch tires on front and rear. This means that on some cars at this price 32-inch sizes are used, whereas there are a few makers who fit 36-inch sizes.

The Chicago \$2,500 car is 32 horsepower, this being in advance of the garden car, which was 28.6, and not quite up to the palace cars, which was 32.7 horsepower. It has a bore of 4.26, a stroke of 4.57, and a



EXHAUST AND INTAKE SIDES OF FULLER MOTOR, SHOWING SIMPLICITY AND ACCESSIBILITY OF THE FOUR-CYLINDER L TYPE EN BLOC CONSTRUCTION



RAMBLER L TYPE MOTOR, SHOWING WATER CONNECTIONS AND SOLID CONSTRUCTION

piston displacement of 308.2 cubic inches. It is most interesting by way of comparison to note that the garden car was lower in horsepower and had a piston displacement of 261 cubic inches. These sidelights of comparisons are very interesting when it is remembered that this third division of motors is largely composed of new cars, and, as such, it shows, in many cases, perhaps, not as careful a study into the situation as has been carried out by many of the makers who have been in the field for 4 or 5 years.

## Types of Cylinders Used

Passing to the matter of type of cylinders used, the L leads with 66.7 per cent followers; the valve-in-the-head type comes second with 25 per cent to its credit, and the T-head has but 8.3 per cent, which is less than it had in the \$1,500 class in this division. In fact, the T-head type of cylinder is much less in evidence in all four types of cars in the Chicago division than in the New York two. This is the only example in this division of where casting cylinders in pairs is more popular than casting them separately, the figures being, in pairs, 54 per cent, and separately

46 per cent. Even in the \$4,000 car, which will be reviewed later, the casting of them separately is slightly in advance of the twin method. This is in direct opposition to the practice shown on \$2,500 cars at the palace and garden shows, where the casting in pairs was as high as three to one in the lead. It is difficult to explain why the separately-cast cylinder has such a big following in the present division.

In a hurried review of the cooling situation but 4 per cent are air-coolers, 83.3 per cent use pump circulation, and 12.7 thermo syphon. For the first time in the \$2,500 class does double ignition take the lead, with dual second and single third. At the garden show the double was in the lead, as it was at the palace show, so that in this respect there is a consistency in the three big divisions. For the first time pressure feed on the gasoline makes its appearance, having 21 per cent followers. In the lubrication it is a repetition of the story in which the circulation system has more than twice as many followers as the mechanical oiler and with compression lubricators a poor third.

A resume of the clutch situation shows

that the multiple-disk has come into the lead, displacing the cone, which was a leader in the \$1,500 class. To be exact, the multiple-disk has 54.3 per cent of the followers, the cone 29, the internal band 12.5 and the external band type 4.2. This is the only classification in which the external and internal-band types appear.

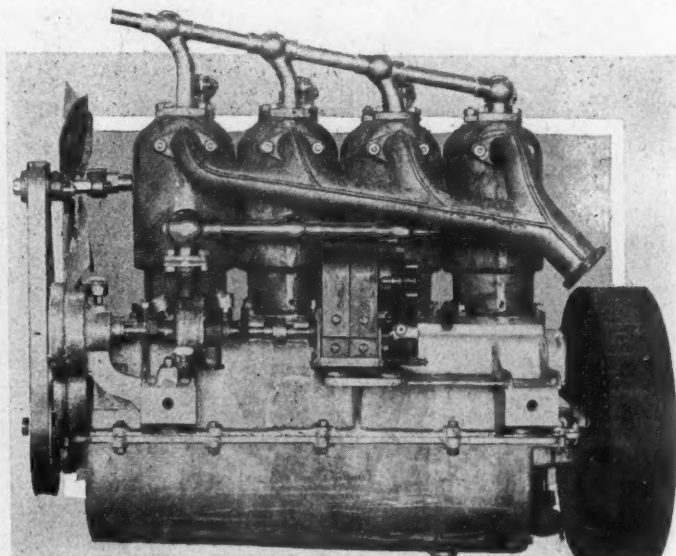
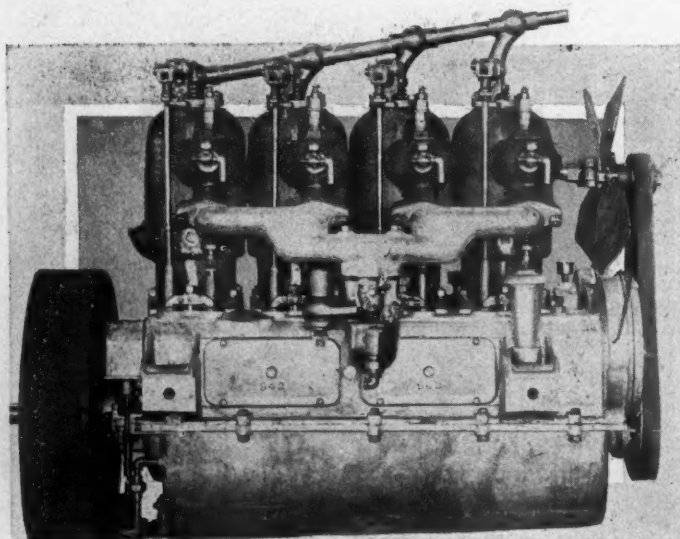
Statistics show that the selective gearset is a steady gainer in the ascending scale of prices, being used on 91 per cent of the cars in the \$2,500 class, whereas the progressive and planetary divide the remaining honors equally. All of the cars in this division are shaft-drive vehicles.

## The \$4,000 Car

Coming lastly to the \$4,000 car in the Chicago classification, considerable similarity with the \$4,000 car as shown at the palace and garden shows appears. It is quite remarkable that this car should have a formula rating of 42.9 horsepower, whereas at the licensed show in New York the \$4,000 car averaged 42.2 horsepower, and at the palace show this figure jumped to 51.1 horsepower. This \$4,000 Chicago car has a bore of 4.78 inches, a stroke of 5.18, and a piston displacement of 439.2 cubic inches. This piston displacement is but little less than that of 51.1 horsepower car at the palace show, which was 448 cubic inches, a fact which shows that the long-stroke motor is more in evidence in the Chicago classification than it was at the Grand Central palace.

Comparatively speaking, it would seem that the \$4,000 car at the palace show was a bigger proposition than at either of the garden or Chicago shows. Referring to wheelbases alone, the average \$4,000 car at the palace had 126-inch wheelbase, at the garden it averaged 122 inches, and in this Chicago classification it is 123 inches. The tire situation at all three shows is practically alike for this priced car, the sizes averaging slightly over 36 inches, all around.

In a hasty review of the motor conditions in the Chicago classification, the following points may be noted: First, 61.5



INTAKE AND EXHAUST SIDES OF GREAT WESTERN ENGINE WITH ITS EXHAUST VALVES IN THE CYLINDER HEADS AND INTAKES IN THE SIDES



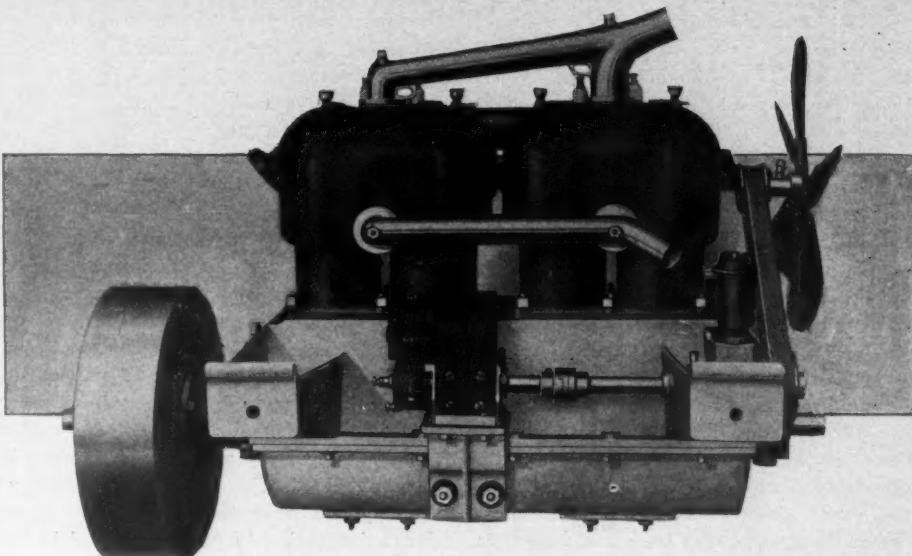
are four-cylinder types, and 30.8 six-cylinder types; 53 per cent uses the L-type cylinder, 30 per cent the valve-in-the-head type, and 15 per cent the T-head type; 53.8 per cent uses separately-cast cylinders, 46.2 per cent have the cylinders in pairs; and there is not a case of en bloc construction; and 85 per cent are cooled by pump circulation, and the remainder divided equally between air coolers and those cooled by thermo-syphon means.

There is one difference in the ignition phase of the question in connection with this show, namely, that dual ignition is used by 61 per cent and double ignition by 23 per cent, the remainder using a single type. This is the first case in a \$4,000 car where dual ignition is more popular than the double type. At the licensed show the double type was in the majority, at the Grand Central palace show it was a neck-and-neck race between dual and double, and now comes the Chicago show in which the dual leads. This would show that, at least, with the majority of new makers the dual is receiving the lion's share of attention.

## Race Between Gravity and Pressure

What was true with reference to the use of pressure feed in high-priced cars at the two previous shows is true in this case, namely, that gravity feed is in the lead, although closely followed by pressure. It is somewhat remarkable that the percentage of cars using pressure feed on the gasoline is higher at Chicago than in the two previous shows, the Chicago figures being gravity 53.8 per cent and pressure 46.2 per cent. At the palace show in the \$4,000 class there were twice as many using gravity as pressure, and at the garden show the gravity feed had a 50 per cent lead.

The lubrication story of this \$4,000 car is the same as that in the other two shows, namely, that all other systems have been dropped with the exception of the circulating and mechanical oiler, the ratio being two-to-one in favor of the circulating pump with crankcase reservoir. Once more one is compelled to record a victory for the



RIGHT SIDE OF BIG BLACK MOTOR WITH CYLINDERS CAST IN PAIRS

multiple-disk clutch with 53.8 per cent to its credit, as compared with 38.5 per cent followers of the cone type. At the palace show the cone clutch was by far the leader, whereas at the garden show the multiple-disk led, so that making a rough estimate at the three shows the multiple-disk remains a leader with the cone type a very close second, and the expanding band and clamping band type practically out of the running.

It is scarcely necessary to add that the selective gearset has over 85 per cent of the followers, with 7 per cent using the progressive type and 7 per cent the friction system. It is a coincidence that the percentage of shaft-driven cars is 85, being practically the same as those using the progressive gearset.

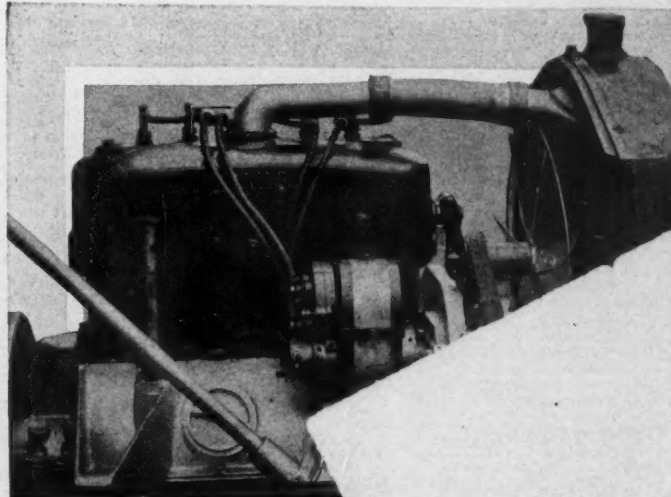
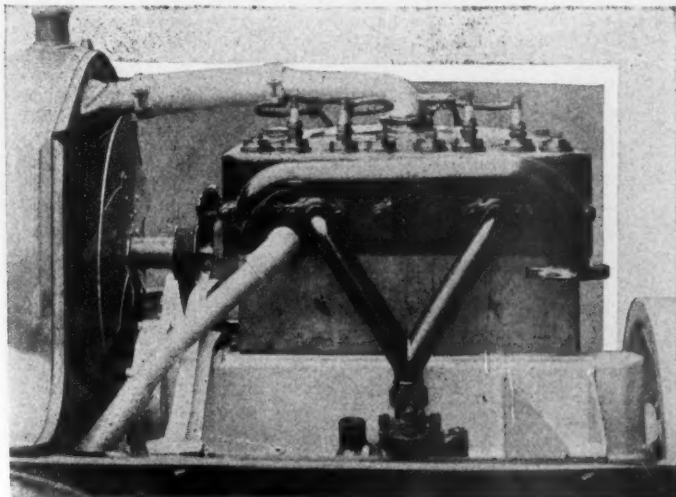
## Black Crow Construction

Of the motors illustrated on these pages none is more interesting than that of the Black Crow car, page 10, in which the four cylinders are separate castings with opposite valves, but a continuous waterjacket is accomplished by cutting away the adjacent faces of the jackets and milling the edges so that the four cylinders are brought close together and held in such position

by six longitudinal bolts extending from the rear of the fourth cylinder to the front of the first. By this construction the four cylinders are made as rigid as in a monoblock casting and the continuous water-jacket is the same as in that type of casting. On this motor thermo syphon cooling is used, the intake water pipe connecting from the radiator to the front of the first cylinder, and the large diameter return pipe passing from the top of each cylinder. This motor is suspended in the chassis frame through I-beam supports, which are separate from the crankcase and to which the crankcase attaches by four vertical bolts. This type of support, introduced some years ago on the Pierce cars, is becoming very popular. It simplifies the crankcase casting, is undoubtedly stronger, and occupies less space than does the aluminum type of arm. On this motor the circulating system of oiling is used.

The Black Crow uses another type of motor, illustrated herewith, and which is of a more conventional construction, with L type of cylinders cast in pairs. This motor uses thermo-syphon cooling and has a circulating oiling system.

A departure with the Lambert cars this



TWO VIEWS OF THE LAMBERT FOUR-CYLINDER L TYPE MOTOR IN WHICH THE SIMPLICITY AND ACCESSIBILITY OF

year is the employment of a four-cylinder, mono-block motor on several of its models, this model being manufactured by the Davis company and illustrated on page 13. The cylinders are of the L type with valves on the left side and cover plates conceal the valve springs and the push rods. Both intake and exhaust manifolds are of external construction. Thermo-siphon cooling is used, assisted by a belt-driven fan.

Another new mono-block motor for this season is that used in the Fuller, which has begun building four-cylinder cars. From the illustrations of both sides of this motor, Fig. 11, it shows it to be a clean-cut job with the intake and exhaust pipings incorporated in the cylinder casting, and the two water pipes reduced to the simplest construction which has been made possible by the use of thermo-siphon circulation. The cylinders are of L design, with both sets of valves operated from one camshaft. The motor is a symmetrical unit with the carburetor centrally positioned on one side and the magneto similarly located on the other side. A circulating system of lubri-

cation is used. The motor support at the rear end is a transverse tube and at the front end is a single support giving a three-point suspension.

#### Great Western Type

The Great Western cars make use of a unique type of motor of which both sides are illustrated on page 12. This motor has separately-cast cylinders with offset valve chambers on the right side for the intake valves, whereas the exhaust valves are located in the center of the dome of the hemispherical combustion chambers. One camshaft controls both sets of valves, the intakes being opened through direct valve lifters, but the exhaust necessitating rocker arms. Oiling is by a circulating system in the crankcase. The magneto is located on the opposite from the carburetor. Pump circulation assisted by a fan is used in the cooling system.

#### The Rambler Four

For this season the Rambler company manufactures one type of four-cylinder motor, which bears a striking resemblance to its motor of last year, although refined in many respects. This motor has, since

its inception, been characterized by a tubular crankcase, the right side of which contains an enormous inspection opening through which the lower connecting rod bearings may be adjusted. This motor always has used the offset crankshaft which has shown a high percentage of horsepower efficiency, as compared with the non-offset type. A feature on this motor is the adjustable crankshaft bearings, of which there are three. A wedge device is used in this adjustment, this wedge operating so as to force the upper half of the bushing down, giving the necessary adjustment.

On the Austin cars, which are all of the six-cylinder type, three varieties of motors are used—one with cylinders cast in pairs and of the L type, the others with separately-cast cylinders and of T design, having the intakes on one side and the exhaust valves opposite. Still a third type of Austin motor is used in which the intake valves are located in the cylinder head and operated by rocker arm, whereas the exhausts are in offset on the left side. On these motors the circulating type of lubrication is made use of.

THE FOUR AVERAGE MOTORS OF THE CHICAGO, A. L. A. M. AND A. M. C. M. A. SHOWS

	Chicago				A. L. A. M.				A. M. C. M. A.			
AVERAGE	\$1,000	\$1,500	\$2,500	\$4,000	\$1,000	\$1,500	\$2,500	\$4,000	\$1,000	\$1,500	\$2,500	\$4,000
Wheelbase, inches.....	96	109	116	123	100	109	112	122	92	109	114	126
Front wheel, inches.....	30.7/3.1	32.9/3.5	34.6/3.9	35.8/4.3	32 dia.	34	33	35	30	33	34	36
Rear wheel, inches.....	30.7/3.1	32.9/3.5	34.6/3.9	36.0/4.5	32	34	34	35	30	33	34	36
Price of car.....	\$842	\$1,377	\$2,196	\$3,715	\$975	\$1,500	\$2,155	\$4,033	\$784	\$1,360	\$2,133	\$3,800
MOTOR												
Number of cylinders—												
One .....									8%			
Two .....	66.7%	9.5%							23%	5%	4%	
Three .....					100%	100%	100%	62%	69%	90%	84%	60%
Four .....	33.3%	90.5%	83.3%	61.5%								
Five .....				7.7%				38%		5%	12%	40%
Six .....			16.7%	30.8%								
Average bore, inches....	4.17	4.26	4.35	4.78	3.75	4.17	4.2	4.7	3.83	4.10	4.41	4.82
Average stroke, inches...	4.25	4.57	4.80	5.18	4.5	4.5	4.6	5.06	4.00	4.31	4.89	5.15
Average A. L. A. M. H. P.	21.6	27.4	32.0	42.9	22.5		28.6	42.2	17.2	26.6	32.7	51.1
Average piston displacement .....	179.7	243.2	308.2	439.2	198.8		261.2	424.7	129.2	226.2	314.5	448.2
T-type cylinders.....		9.5%	8.3%	15.4%			20%	51%	23%	20%	28%	58%
L-type cylinders.....	100%	71.5%	66.7%	53.8%	100%	100%	50%	27%	61%	75%	56%	26%
Valves in the head.....		19.0%	25.0%	30.8%				14%	15%	5%	8%	20%
Two-cycle .....							30%	8%			4%	
Cylinders—												
Cast separately.....	66.7%	47.7%	46.0%	53.8%	50%	67%	40%	29%	54%	50%	24%	20%
Pairs .....		38.0%	54.0%	46.2%			40%	69%	23%	35%	76%	80%
In bloc.....	33.3%	14.3%			50%	33%	20%	2%	23%	15%		
Water-cooled—Thermo ..	66.7%	28.5%	12.5%	7.7%	50%	33%	30%	85%	85%	45%	20%	7%
Cir. pump.....	16.7%	66.7%	83.3%	84.6%	50%	67%	60%	93%	8%	40%	80%	93%
Air-cooled .....	16.6%	4.8%	4.2%	7.7%			10%	7%	8%	15%		
Ignition—												
H. T. single.....	100.0%	52.5%	25.0%	15.4%	50%		50%	16%	39%	15%	8%	
Dual .....		33.3%	33.3%	61.5%	50%	33%	20%	30%	30%	65%	44%	47%
Double .....		19.0%	37.5%	23.1%		67%	30%	47%	30%	20%	48%	47%
Make-and-break .....								4.5%				6%
L. T. single.....			4.2%					4.5%				
Carburetor—												
Gravity feed.....	100.0%	100.0%	79.0%	53.8%	100%	67%	100%	60%	100%	95%	92%	67%
Pressure feed.....			21.0%	46.2%		33%		40%		5%	8%	33%
Lubrication—												
Compression oiler...									8%	5%		
Circulating pump...	33.3%	66.7%	63.7%	69.2%	100%	100%	80%	71%	54%	60%	56%	53%
Gravity pump.....	16.7%	4.7%	4.5%						8%	15%		
Mechanical oiler...	33.3%	23.8%	31.8%	30.8%			20%	29%	15%	10%	28%	47%
Flywheel, circulating	16.7%	4.8%							8%	10%	16%	
Gravity feed .....												
Clutch—												
Multiple-disk.....	50%	36.8%	54.3%	53.8%	50%	67%	30%	58%	61%	40%	52%	33%
Cone .....	50%	63.2%	29.0%	38.5%	50%	33%	30%	31%	15%	45%	40%	53%
Internal band.....			12.5%				20%	4.5%	8%	5%	4%	7%
External band.....			4.2%				20%	6.7%				7%
None .....				7.7%					15%	10%	4%	
Transmission—												
Selective 2.....	16.7%		4.1%						23%			
Selective 3.....		65.0%	87.5%	53.8%	50%	67%	80%	49%	8%	60%	96%	53%
Selective 4.....			30.8%				10%	47%		5%		47%
Progressive 1.....												
Progressive 2.....	50.0%	10.0%							8%			
Progressive 3.....		5.0%	4.2%	7.7%				4%	8%	5%		
Planetary 2.....	33.3%	20.0%	4.2%		50%	33%	10%		38%	10%		
Planetary 3.....										10%		
Friction .....				7.7%					15%	10%	4%	
Drive—												
Shaft .....	83.3%	90.5%	100.0%	84.6%	100%	100%	100%	91%	62%	75%	92%	100%
Chain .....	16.7%	9.5%		15.4%				9%	38%	25%	8%	



## FOUR-CYLINDER ENGINES

## LIMIT OF ERROR 0.04 CUBIC INCHES

15

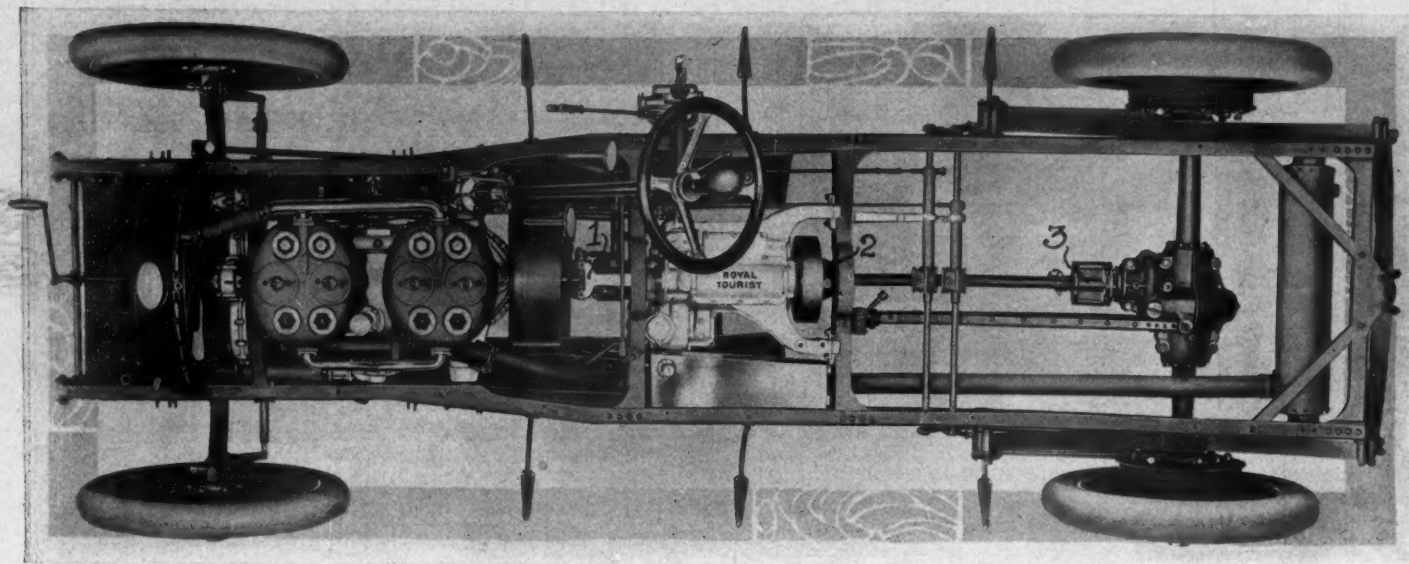


FIG. 1—THE ROYAL TOURIST IS AN EXAMPLE OF THE THREE-UNIT CHASSIS

IN the following pages is given a cursory review of many of the various types of chassis which have been exhibited at the national show circuit as well as some that will exhibit at the Chicago Coliseum show during the coming week. No other part of the car offers greater scope for a general study of the car situation than does the chassis, in that this is the power portion as well as the running gear of the machine. During the last 3 or 4 years several important trends have been struggling for supremacy in the field of chassis design. Perhaps none of these is more conspicuous than that of the suspension of the chassis parts. It has been a long-mooted question whether the gearbox should be located by itself, as in the Royal Tourist chassis, Fig. 1; whether it should be corporate with the rear axle as in the Packard chassis, Fig. 2; whether it should be a unit with the rear axle but located amidship as in the Rambler design, Fig. 3; or whether it should be a unit with the motor as in the Knox design in Fig. 4. These four chassis are fairly representative of the great problem which is confronting engineers at the

## Chicago Show Illustrates

present time, and it is of paramount interest to study how newcomers in the field, of which there has been an army during the past fall, imitate one or other of these designs.

### Three Chassis Type

For a matter of convenience, in order that there may be no confusion in the mind of the reader regarding these four chassis types, the Royal Tourist, Fig. 1, will be designated the three-unit type, the reason for this nomenclature being that the motor comprises one unit, the gearbox a second unit, and the rear axle a third unit. In contrast with this all of the other three chassis, namely Packard, Rambler and Knox, may be properly described as two-unit design, in that, in the case of the Packard and the Rambler, the gearbox and rear axle are one unit, and the motor the other unit. In the case of the Knox, the motor and gearset constitute one unit and

the rear axle the second unit of the chassis.

In order that the efficiency of the chassis be as high as possible it is of utmost importance that there is alignment between the different units. In case of the Royal Tourist the crankshaft of the motor should align with the mainshaft of the gearset, and this in turn with the rear axle. In order to have regard for any misalignment, caused by strains in the frame, universal joints are invariably inserted between the units, 1 marking the position of the universal between the motor and clutch, and 2 and 3 showing the presence of two universal joints in the propellershaft, the latter two being necessary because of the vertical movement of the frame occasioned by the spring action. Roughly speaking, then, in three-unit chassis it is often necessary to employ three universal joints, although in a number of these chassis such as Stoddard-Day-

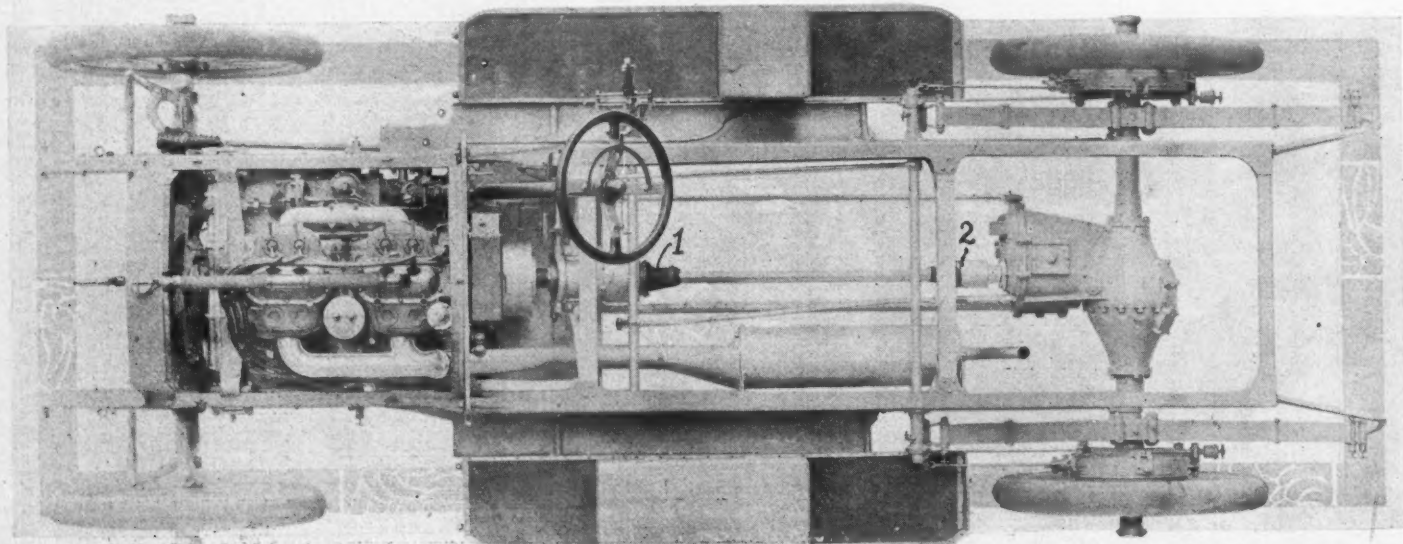


FIG. 2—THE PACKARD WAS A PIONEER IN TWO-UNIT CHASSIS DESIGN



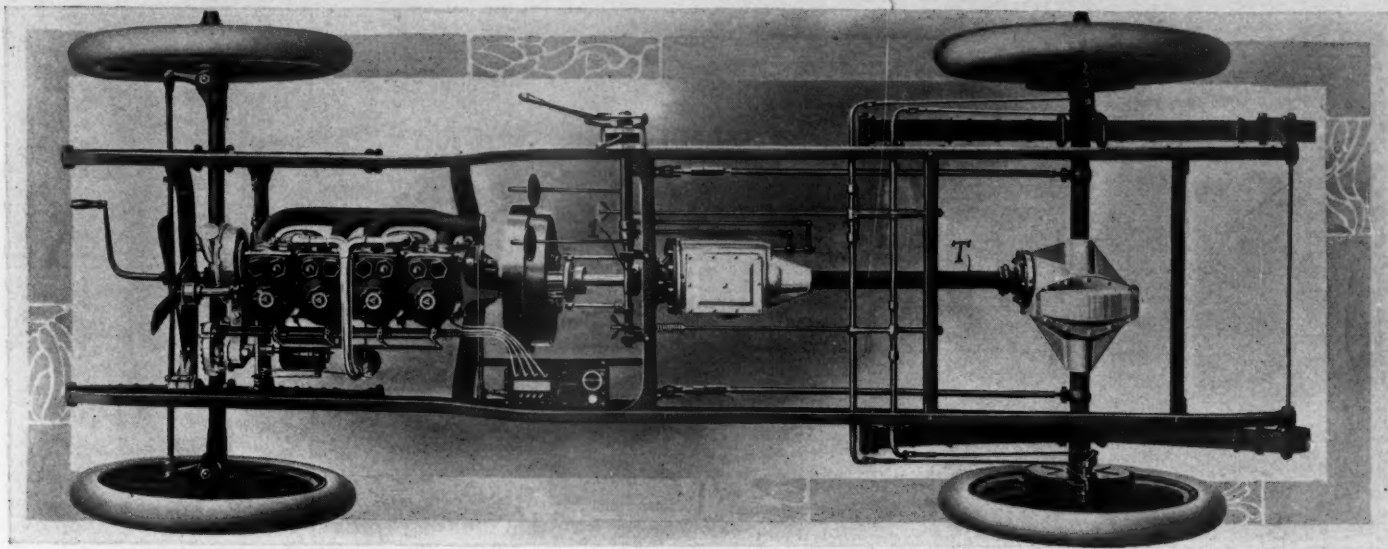


FIG. 3—THE RAMBLER IN A UNIQUE TWO-UNIT TYPE OF CHASSIS

## Trend In Chassis Design

ton, etc., where a torsion tube incloses the propellershaft universal joint No. 3 is eliminated, leaving but numbers 1 and 2 in the system.

In the two-unit car chassis, exemplified in the Packard, Fig. 2, two universals are used, No. 1 being at the forward end of the propellershaft and No. 2 at the rear end of this shaft and in front of the gearbox. It is not always customary in two-unit chassis to employ two universal joints, as an examination of the Rambler, Fig. 3, will show, there being but one universal in this system and that at the point designated 1, which is immediately in advance of the gearbox. The elimination of the second universal joint is accomplished by the introduction of a torsion tube T, which is at its forward end rigidly inserted into the rear end of the gearbox and at its rear end is bolted to the differential housing, which makes the rear axle and gearbox to all intents and purposes a unit, in

spite of the fact that the gearbox is located near the center of the car instead of back with the axle as in the case of the Packard. It will be well to interject that at the point of the universal joint 1 there is a ball-and-socket support for carrying the forward end of the gearbox on the frame.

### Features of Knox Chassis

The Knox chassis, Fig. 4, employs two universal joints, Nos. 1 and 2, respectively. The necessity of two being occasioned by not using a torsion tube to inclose the driveshaft. This chassis is representative of a large class of chassis at the present time in that the motor and gearbox are one. The Stevens-Duryea was one of the pioneers in this construction and Maxwell cars since their inception have always formed these two units as one, and like the Stevens-Duryea have supported them at three points as is done in case of the Knox chassis. The Chalmers-Detroit 30 is an-

other example of the unit motor and gear-set. The present Dorris cars have combined these two parts since their introduction on the market several years ago. The Ford four-cylinder types are all of this design. The new four-cylinder Patterson chassis follows this construction. The Herreshoff is another example of it. Other exponents of this are Cole, Mora, Lion, Hupmobile, Jackson, Moline, Midland, etc.

For several years the Packard was the pioneer in mounting the gearbox on the rear axle, but within the last 2 or 3 seasons a score or more of makers have copied this design and now there is a formidable array of what may roughly be styled the rear-axle gearbox. Among these might be noted such cars as Marion, E-M-F, Marmon, Stearns 30, two-cycle American Simplex, Pennsylvania, some Overland models, Black Crow, Cameron, Crawford, Everitt, Glide, Moon, small Mora, Regal, Matheson six.

The list of exponents of the two-unit design, illustrated in the Rambler chassis, namely that in which the gearbox is one with the rear axle but carried midway of the axles, is not large. The 1910 Mitchell cars have used this construction; the Inter-

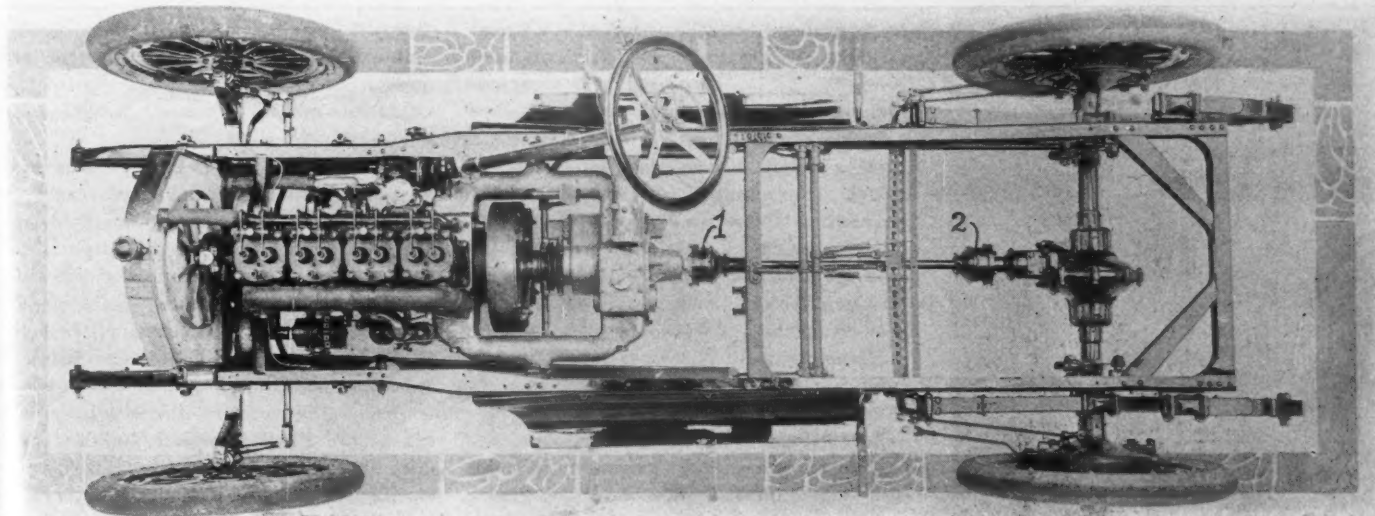


FIG. 4—THE KNOX IS A REPRESENTATIVE TWO-UNIT CHASSIS DESIGN

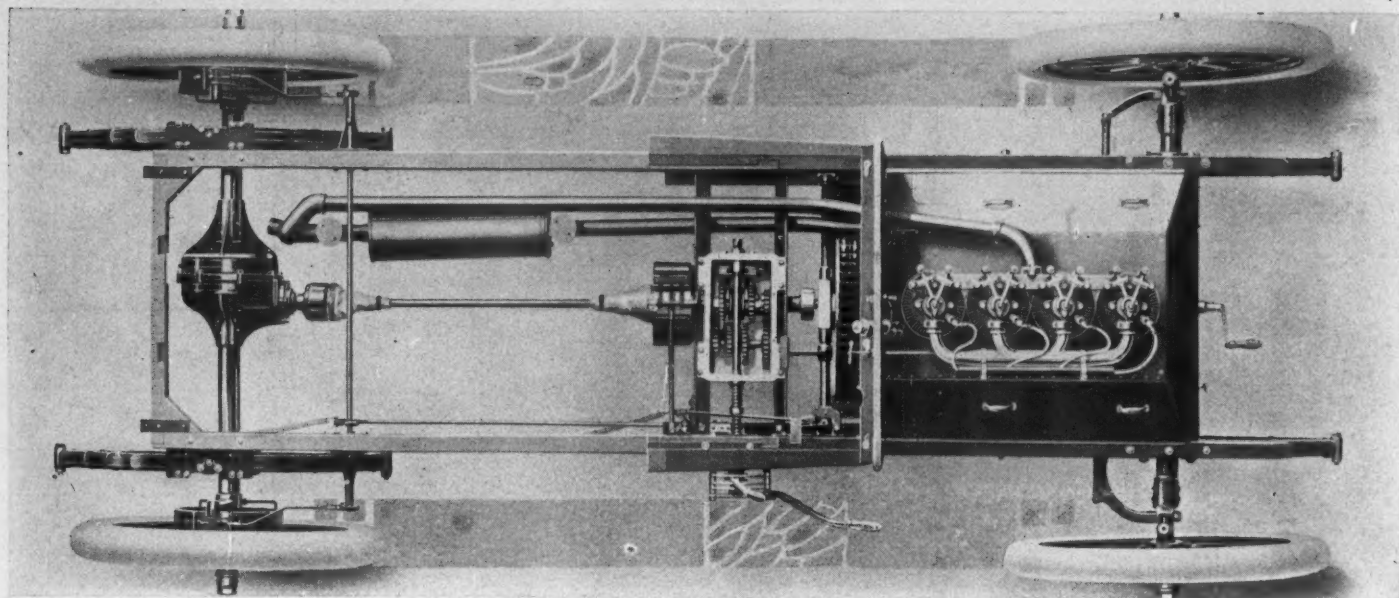


FIG. 5—NEW AIR-COOLING SCHEME USED ON FRANKLIN CHASSIS

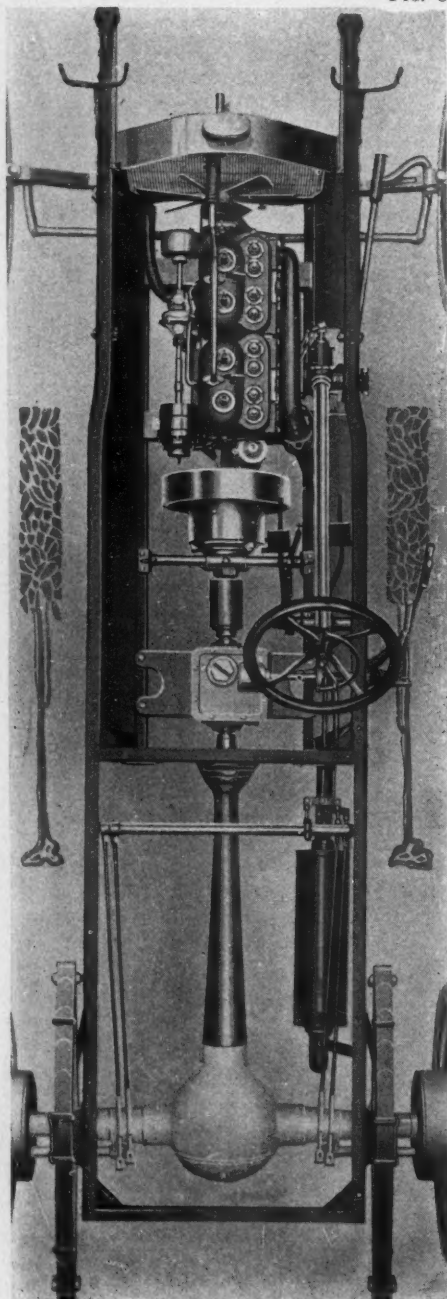


FIG. 6—STAYER CHASSIS

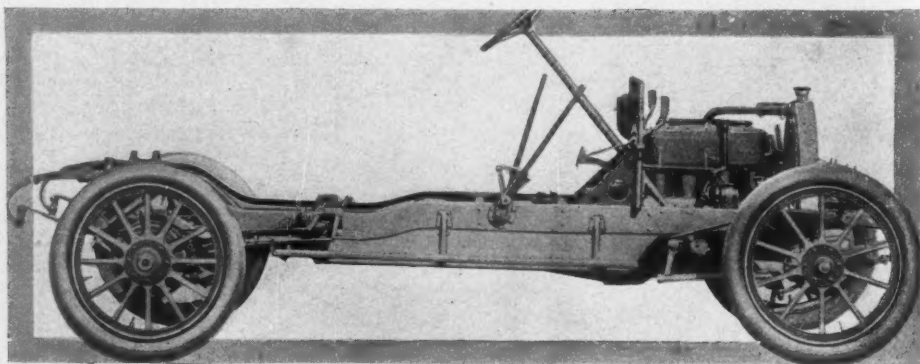


FIG. 7—DOUBLE-DROPPED FRAME ON SMALL STEARNS

State employs it, and on the Overland six a design of this nature is made use of. The type of chassis, typified by the Royal Tourist, Fig. 1, has a big following throughout the country. This is perhaps the oldest type of chassis on the market, but continues in popularity for the great majority of manufacturers. It is used on such cars as Pierce, Peerless, Winton, Locomobile, Franklin, Studebaker-Garford, Chalmers 40, Premier, White, Speedwell, Stoddard-Dayton, Thomas, Simplex and a score or more of other makers. With all of these the argument is that there is an even distribution of weight over front and rear axles, and that with the heavily reinforced frame construction which has been adopted during the last 12 or 18 months, the problem of misalignment of the motor, gearset and rear axle has to a large extent been eliminated; and should misalignment between any of these occur the development of the universal joint has been brought to a state of perfection that said misalignment is compensated for without any appreciable loss of efficiency.

#### Other Phases of Design

Forgetting for the time being the two-unit, or three-unit chassis construction, it is of no less interest to take a fleeting glance at the question of some phases of motor design as exemplified in the present chassis

illustrations. In the early days of motor-ing the single-cylinder chassis enjoyed a certain amount of prominence; in fact, some of the biggest makers of medium-priced cars, such as the Reo, have turned out the single-cylinder car in large quantities annually until the present season and continue to market it. The single-cylinder chassis never enjoyed the prominence in America that it did in Europe, in fact in Europe today such single-cylinder designs as de Dion, Delage, Sizaire-Naudin, Lion-Peugeot, and other equally well-known makes are manufactured and sold in large quantities. In America the Brush run-about has stood in a class by itself in the single-cylinder field, in view of the fact that it has used the vertical cylinder instead of the horizontal as employed by the Reo. On the Brush chassis the employment of a balancing shaft incorporated within the crankcase and gear driven from the crankshaft has constituted a leading novelty and merit in conjunction with this little car. There is no other concern in America which has placed such whole-hearted confidence in the single-cylinder car as the Brush company, building as it does in thousand quantities this type of car alone, and being engaged at the present time in adding to its factory facilities in order to take care of the increased demand



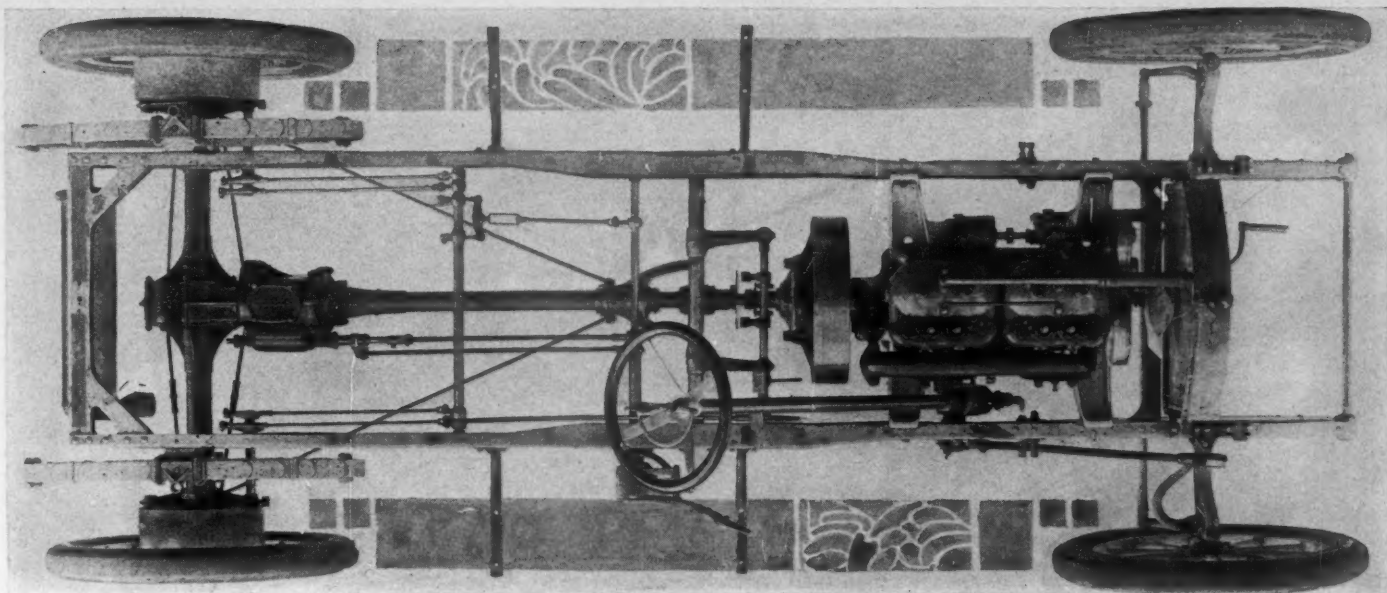


FIG. 8—THE MARION IS AN EXAMPLE OF TWO-UNIT CHASSIS CONSTRUCTION

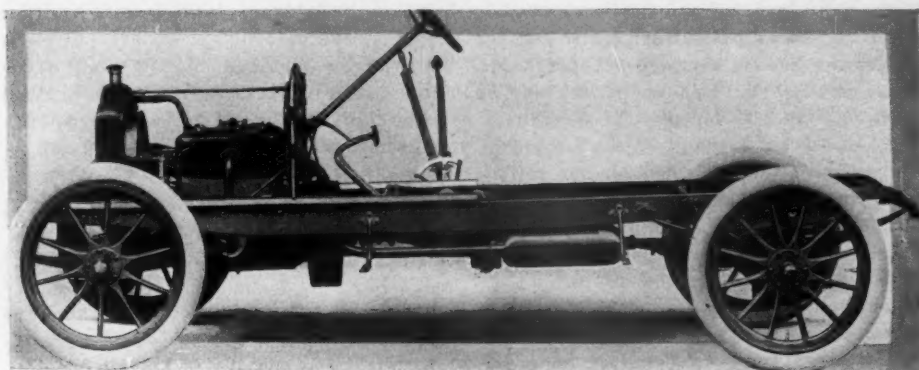


FIG. 9—WHITE MONO-BLOC 1910 MOTOR

for this type of car. In this regard the Brush occupies a unique position in American-car history. It started out with designs peculiar to itself, and has seen fit to successfully continue it, in spite of the enormous preponderance towards the multi-cylinder chassis. At present the one-cylinder car is manufactured by one-half of 1 per cent of the makers.

Compared with the one-cylinder car the two-cylinder one has had a widely different history in America. Perhaps no other chassis type is more deserving of the name, the American chassis, than is the two-cylinder design. This construction was used on the early Haynes-Apperson models, Alexander Winton brought out one of the most successful cars of this design; this method of construction was given every attention by the Rambler company, and in fact before the debut of the four-cylinder type it was the recognized chassis, and was for years considered by many to be the chassis that would eventually reach the top. The lack of wisdom in such predictions has been sufficiently proven, and now the two-cylinder chassis is built by but 4.55 per cent of the manufacturers of the country.

#### Passing of the Twin

The supremacy of the two-cylinder chassis was ended by the landslide of popularity in the four. Perhaps there has been

no other phase of the motor car design in America that has been more conspicuous than the avalanche towards the four-cylinder type. This began in 1904, and for 3 or 4 years it looked as if it would only control the medium and high-priced field, leaving the low-priced car in the hands of the two-cylinder designers.

The last 2 years, however, have broken this dream, because during which time one by one of the old standbys of two-cylinder construction have passed in their hopes with the four. The bringing out of the cheap four-cylinder Ford some seasons ago, was without a doubt the cause of this change. Buick discovered that to compete with the Ford in the \$1,000 field it must bring out a similar style of car. Within the last year the Reo company has followed the same design, and the Maxwell company has introduced and is pushing with vigor its four-cylinder low-priced car. Many other names in the four-cylinder field below the \$1,000 mark might be added, including Hubmobile, Lambert, Empire and others.

At present the war is on between four and six-cylinder motor construction, with 77.2 of the manufacturers building four-cylinder cars and 17 per cent producing the six-cylinder type. The progress of the six-cylinder car has not in any wise been com-

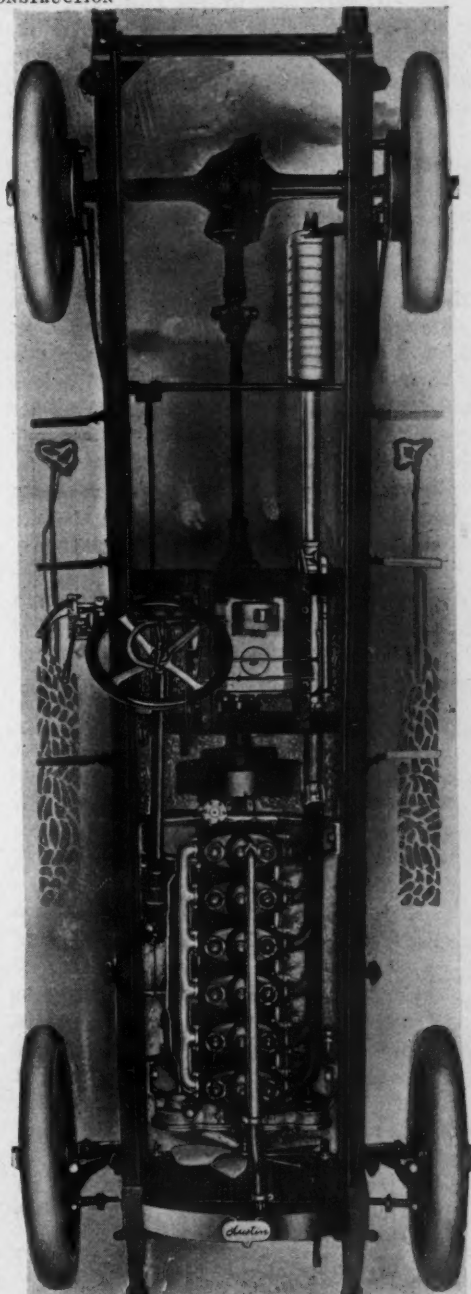


FIG. 10—AUSTIN CHASSIS

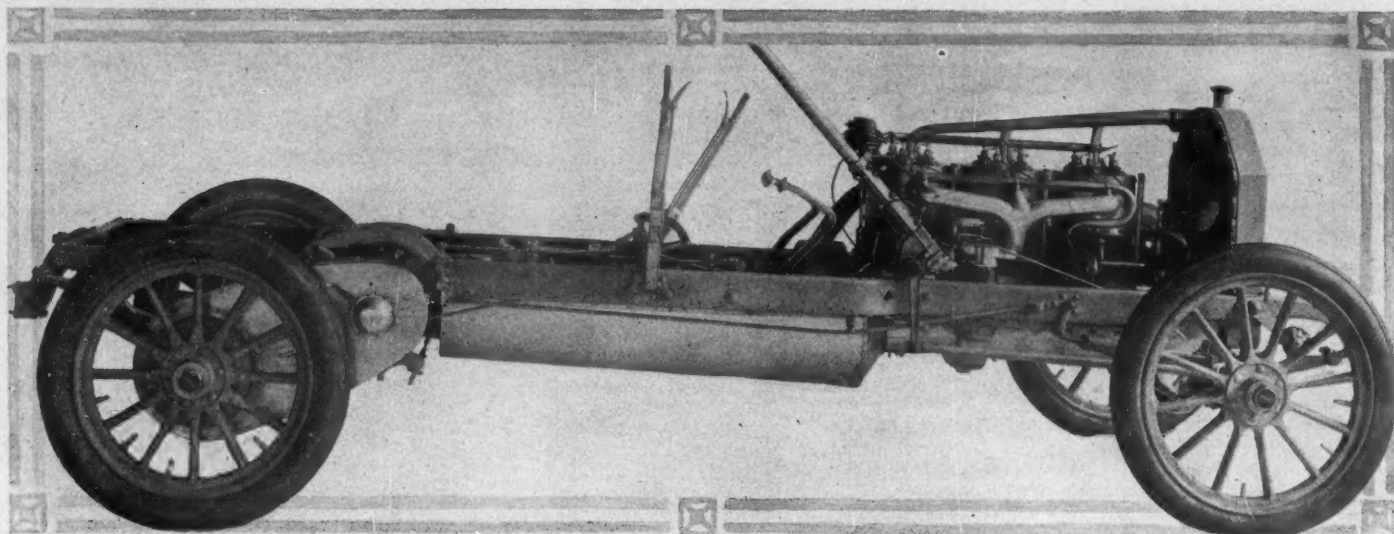


FIG. 11—CHADWICK CHAIN-DRIVE CHASSIS WITH SIX-CYLINDER MOTOR

parable with that of the four, and it is difficult to explain just why this is the case. An undoubted factor in the maintenance of supremacy by the four has been the prestige established by these cars in practically all big racing events up to the last season. Until the Alco six won the Vanderbilt, during the last autumn, and the Lozier six established new 24-hour track records, the feeling has been among the great public that six-cylinder cars were not so good as fours for racing purposes. Many argued that the higher speed at which the magneto had to run made it impossible for a car to compete in a long event without ignition troubles. This has been exploded, and for 1910 the six and four-cylinder cars, so far as racing is concerned, will practically begin on even terms. It would be an injury to the six-cylinder designs to overlook the phenomenal 24-hour record established on the Brooklands track by S. F. Edge in a Napier car in which event he covered 1,581 miles 1,310 yards, maintaining an average pace of 65 miles per hour.

## Six vs. the Four

In the touring field the relative merits of the six and four-cylinder types have been somewhat different, chiefly in America, where Pierce six-cylinder cars have been victorious in the Glidden tour every year since its inception; in fact, in the touring field the merits of the six have been readily recognized. The Stevens-Duryea company has been a consistent exponent of it, the Winton company has cast its entire effort alone this line, and within the last couple of seasons practically every maker in the high-priced field has found it necessary to bring out a six-cylinder model. Buyers have come to realize that the greater flexibility in the six is a point to be desired, and that there is more ease in operating a six-cylinder car than there is with the four.

In Fig. 5 is shown the Franklin air-cooled chassis which has been altered for 1910 by the addition of a new cooling sys-

tem for the cylinders, in which the cylinders are air-jacketed and the flywheel made a fan for drawing a current of air into the top of the jackets over the cylinder heads. This recalls the principle of the system used on Frayer-Miller cars for several seasons, in the employment of the air jacket. Numerically, the air-cooled car has not the following it had some years ago, although the confidence of the Franklin and some other concerns in it remains as commendable as ever. At present but 6.3 of the manufacturers build air-cooled chassis, as compared with 92.1 per cent building the water-cooled type, such houses as Knox, Premier, Marmon and Corbin have landed almost entirely to the water-cooled chassis.

One new type of construction, which has been making its appearance during the last two seasons in America, is illustrated in Figs. 7 and 9, namely, the four-cylinder motor with all four cylinders formed in one casting, this being designated by many in imitation of the French, the en bloc system. Fig. 7 shows the 15-30-horsepower Stearns car now in its second year in which this design is used. In Fig. 9 appears the new gasoline White car brought out for the first time this year. Both illustrations

show the simplicity of these motors in comparison with the separately-cast cylinder type, or the cast-in-pair variety. Particularly in the White is this simplicity exemplified, and in which case it has been made possible by incorporating the intake and exhaust manifolds in the cylinder casting.

## Mono-Bloc Type Coming in

For 12 or 18 months it appeared as if the mono-bloc motor would not be a popular one in America, not even for low-priced cars, but now we find it being introduced in machines listing at over \$2,000. The arguments against the mono-bloc were the climatic conditions which prevail in America, as well as the difficulty of manufacturing such a casting. It was argued that with the cold winter weather so common to many parts of America that the freezing of water in the jacket would destroy the whole casting, the result being a most expensive repair, as compared with the single-cylinder casting. This objection has been largely overcome due to the simplicity of the four-cylinder casting, and the development of the foundry art. At present, although the mono-bloc is prominent in the \$1,000 and \$1,500 field, yet it is gaining in the higher-priced cars. Today 7.9 per cent of the manufacturers use it, in comparison

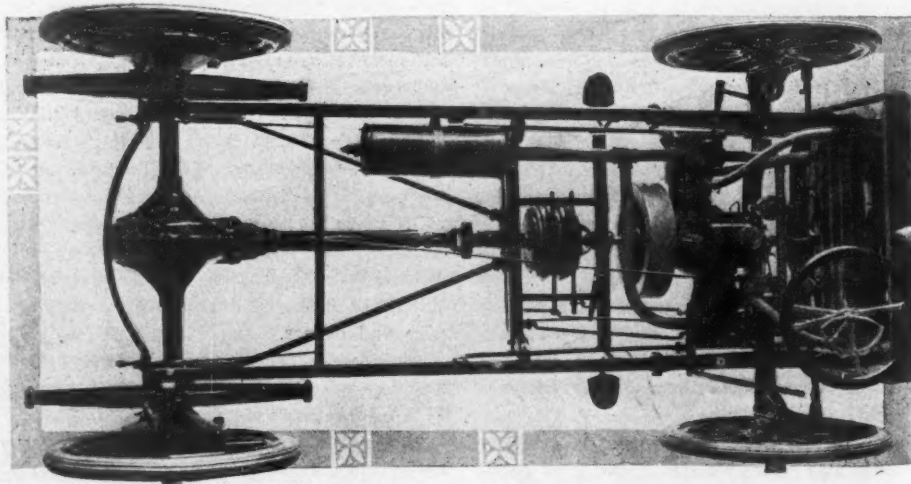


FIG. 12—MONITOR EXAMPLE OF TWO-CYLINDER CHASSIS



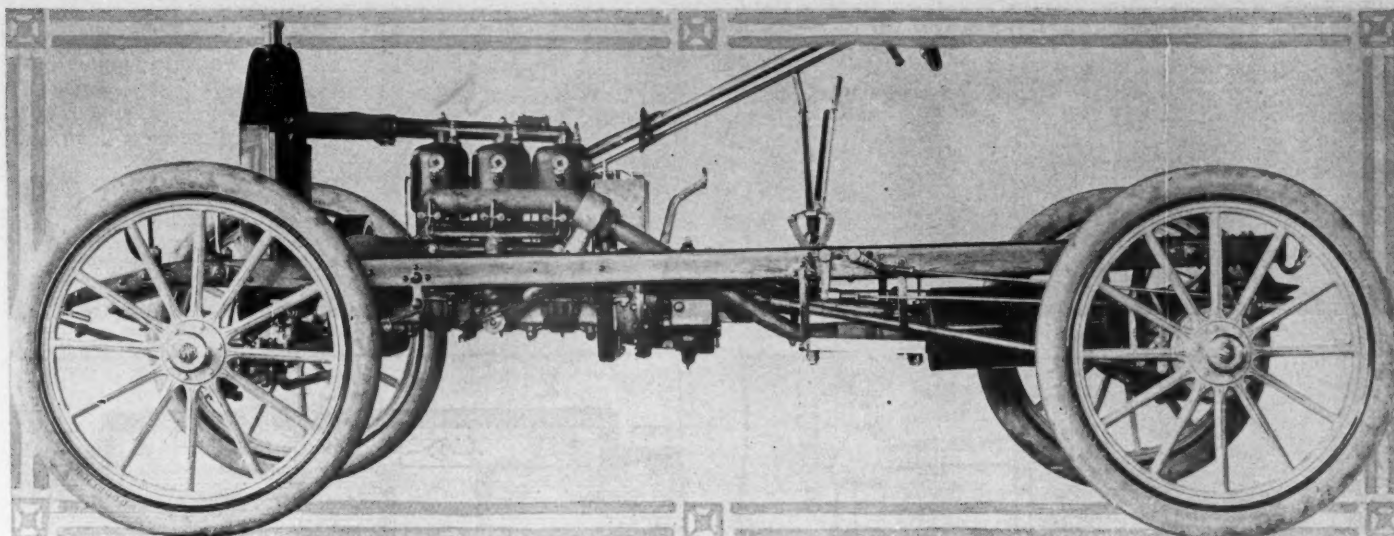


FIG. 13—PAIGE-DETROIT IS A THREE-CYLINDER TWO-CYCLE CHASSIS DESIGN

with 52.8 per cent who cast the cylinders in pairs and 39.9 per cent of the makers who prefer the separate cylinder casting. Nothing better exemplifies the confidence of American manufacturers in the monobloc casting than the fact that several concerns making this type have gone so far as to incorporate the upper part of the crankcase in the casting, this construction appearing in the Ford, Everitt, Jackson 30, and some other models.

When it comes to a matter of considering frame design in chassis, the trend of development may be very clearly followed. In the early days of the two-cylinder car the angle steel frame was popular and consisted merely of a rectangle composed of two straight side members and two end cross pieces. Soon manufacturers began to realize that the armored wood frame was a very resilient member, the majority in this class following the policy of the Panhard, which was undoubtedly one of the most persistent adherents of the armored wood, and it has only during the last few seasons adopted the channel steel construction. It is natural that when the pressed steel frame made its debut that it would follow in general design its predecessor the angle steel type. The first pressed steel

frames had the side members straight from front to rear. It was soon realized that these members must be made of a greater vertical depth in the center, as this was the point of greatest strain and a point at which the motor and gearset were supported. The necessity of additional strength resulted in the introduction of the subframe consisting of two parallel channel members inside of, and lower than the side members, and on which the motor and gearbox were mounted. The subframe made it possible to mount the motor and gearbox lower on the chassis and so give a lower center of gravity to the completed car.

#### The Bottle-Neck Frame

The next step in advance in the pressed steel frame construction was the introduction of the bottle-neck frame, namely, that type of frame in which the side members are curved inward at the dash, the object being to leave more room for turning the front road wheels to right or left. This construction became general in 1905 and 1906, and makers soon realized that an additional advantage could be counted along with it, namely, that it were possible to dispense with the subframe, in that the bringing of the side members closer to-

gether allowed of mounting the motor direct on them. After the introduction of the bottle-neck frame, frame construction remained stationary for a season, until the Peerless company introduced what has come to be known as the dropped frame, namely, that in which the side members curved upwards in front of the rear axle, or, if we consider the rear end of the frame, it will be seen that they drop in front of the axle. This frame has been introduced to lower the center of gravity of the car, and in the last few years it has become general because of the introduction of three-quarter elliptic rear springs. The Peerless company deserves all American honors in connection with this frame, and has continued using the platform rear springs. Soon after the Peerless drop frame came out, the Stoddard-Dayton company accomplished practically the same result by the arch in the side members above the rear axle, which construction became popular for a few seasons but is now practically superseded by the drop design.

A few years ago the exhibition of the Fiat town car at the New York Garden show marked another step in frame construction, namely, the double drop, in which the side members are dropped very perceptibly in front of the rear axle but again raised midway of the chassis. The double-drop construction was taken up by the Stearns people in their 15-30 chassis; it has been used for a couple of seasons on the Palmer & Singer town car chassis and is employed on the 30 and 40 Chalmers chassis of the present season. The double drop is particularly well suited for inclosed types of bodies in that it permits of lowering the tonneau door, as well as the tonneau floor.

#### The Underslung Frame

It would not be complete in this brief review of frame design, as exemplified in the chassis illustrated herewith, not to refer to the underslung frame work of the American roadster car, in which the side members are inverted beneath the axle.

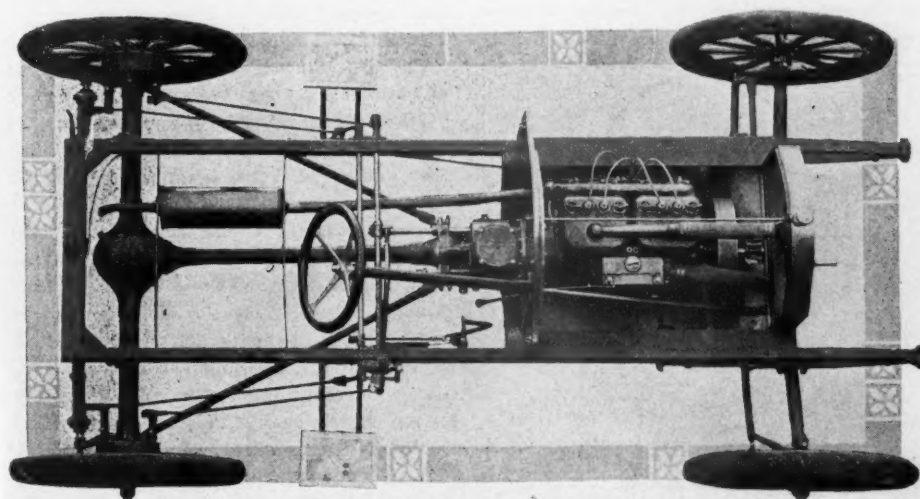


FIG. 14—HUPMOBILE CHASSIS, WITH TRIANGULAR DRIVE SCHEME

# Lubrication

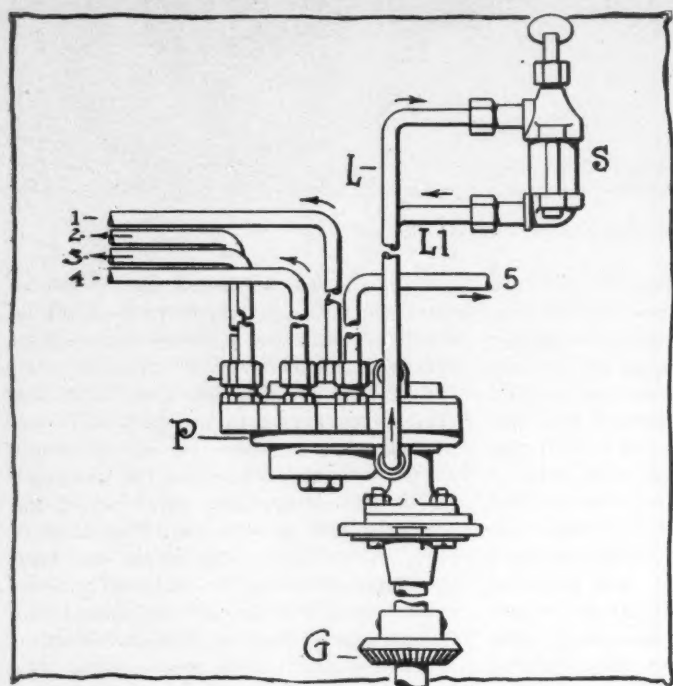


FIG. 1—NEW MAXWELL OIL PUMP

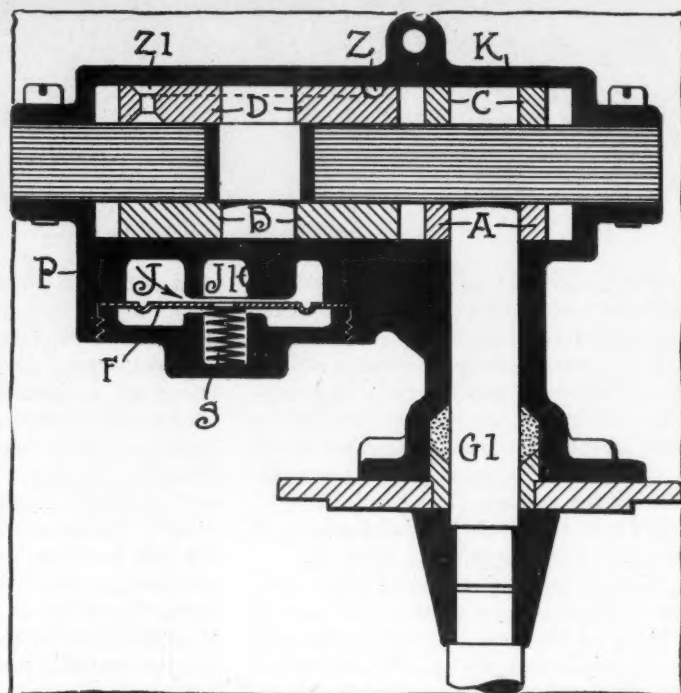


FIG. 2—SECTION OF MAXWELL DOUBLE OIL PUMP

IN the following pages is given a review of the lubricating systems in use on cars exhibited at the Chicago Coliseum show. Unfortunately, owing to not being able to get the information from some manufacturers, this review is not complete, and some of the cars that will be on exhibition have certain interesting features which are not included herewith. Incorporated in this review are systems in use on certain cars which were exhibited at the New York shows but the information regarding which was not obtained in time for the issues of Motor Age pertaining to those exhibitions. As was the case in both New York shows, so with the Chicago show, the circulating system of lubrication is away in the lead, and the general review of the season shows that 63.5 per cent of the different motor cars are fitted with a circulating oil system, as compared with 25.8 per cent fitted with a mechanical oiler. The remainder, 5.3 per cent, should be added to the circulating system in that it includes those makers who use the flywheel as a basis of oil circulation.

On the Rambler cars, which are built in four-cylinder types for this season, a mechanical lubricator is used and it is mounted on the left of the chassis frame beneath the footboards, where it is accessible for filling purposes. This lubricator is belt-driven from the rear end of the camshaft, and the

oil from it is delivered to the four cylinders.

For the coming season the Auburn Automobile Co. is building two and four-cylinder cars, as it did a year ago. On the four-cylinder the Rutenber design of motor is used, in which the oiling system is a circulating one, there being a gear oil pump in an integral compartment of the crankcase at the forward end. From this the oil is pumped to the four compartments of the crankcase, where oil levels are maintained and whence the overflow is returned to the oil reservoir, which is an integral portion of the lower part of the crankcase. On the two-cylinder Auburn a mechanical oiler is

located over the top of the crankcase and delivers lubricant to the two crankshaft bearings, the two cylinders, and the two connecting rods.

On the new four-cylinder Lexington, which is beginning its second season before the American public, the Reutenber system of circulating oil is used, in which a gear pump delivers the oil to the four crankcase compartments, in which a splash level is maintained. On the Dorris car the mechanical oiler is carried under the bonnet on the right side of the motor. From this oiler leads connect with the motor parts.

## The Maxwell System

On 1910 Maxwell cars a new pump system of lubrication has been fitted which is particularly novel. Its general scheme is illustrated in Fig. 1, in which P shows the gear pump and G the bevel pinion through which the pump is driven from the camshaft to the motor. From the pump the oil rises through a lead L to a sight feed S on the dash, and is returned from this sight feed through a lead LI to the oil pump, where another pair of gears delivers the oil to the five leads, 1, 2, 3 and 4, connecting with the cylinders of the motor, and 5, leading to the clutch case. This oil pump P is located at the right rear of the motor.

A more comprehensive scheme of the pump is shown in Fig. 2. In understand-

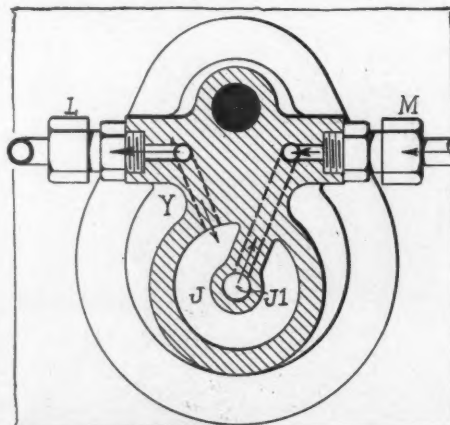


FIG. 3—MAXWELL PUMP BYPASS



ing this illustration the reader must first bear in mind that this is a double gear pump, one pump sending the oil to the sight feed, and the other pump taking the oil which is returned from the sight feed and sending it through the different leads to the cylinders and clutch case. The pump forcing oil to the sight feed is contained in the pump case proper, and consists of gears A and B in mesh with each other, and their relative relationship is seen in part I, Fig. 5. The other pump consists of gears C and D, illustrated in part II, Fig. 5, and these gears are contained in the cover part K of the pump casing. Both pumps are driven through the vertical shaft GI.

## Method of Operation

Having thus briefly analyzed the double phase of this pump, it will now be in order to exploit in greater detail its exact method of operation. The lubricant enters the pump through the inlet M, Fig. 5, which has an opening MI into the interior of the pump compartment. The pump gears are driven in the direction of the arrow and the lubricant is carried by these gears to the opposite of the compartment, where it escapes through an exit L2 and thence through the lead L to the sight feed on the dash. In this respect it is a simple gear pump. From the sight feed the oil is returned through the lead LI and enters the pump, Fig. 5, part 2, housing through the opening L3. The gears C and D rotate in the direction of the arrows, and by them the oil is carried to the opposite side of the pump compartment, where it is compelled to enter a channel Z, whence it is conducted to the opposite side of the gear D and to an opening Z1. As the gear D rotates this opening Z1 registers in rotation with the openings 1, 2, 3, 4, 5 in the pump cover, Fig. 5, part 3. From these openings the oil, as already mentioned, passes to the four cylinders and the clutch case.

One other feature remains in connection with Maxwell pump, namely, that of a by-pass. It will be readily understood that the pump delivers more oil than is needed, and provision must be made to by-pass a portion of the oil so that only the desired amount is fed to the motor parts. In brief, this is accomplished as follows: Fig. 2 shows a

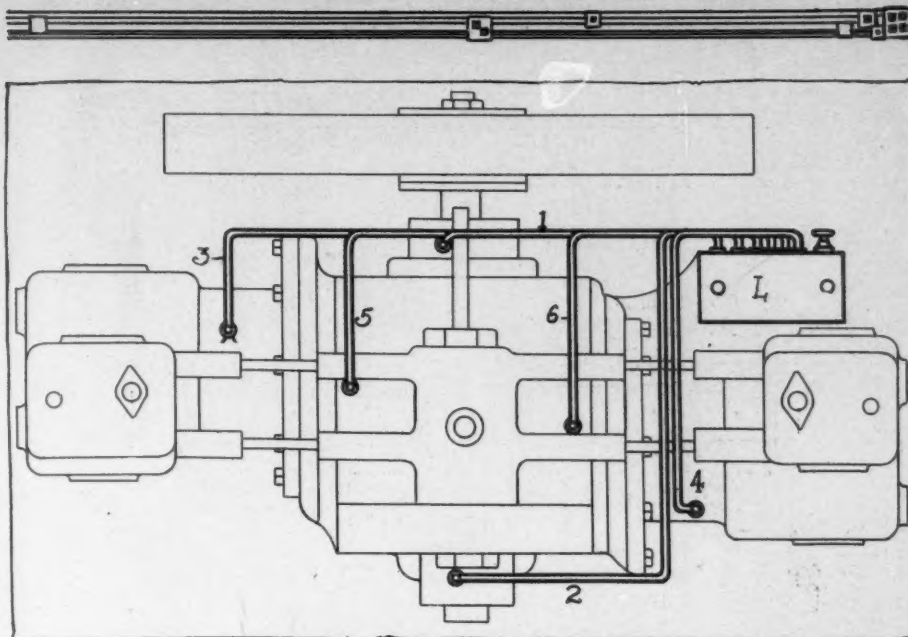


FIG. 4—MECHANICAL OILING SCHEME ON SCHACHT MOTOR

diaphragm F in the lower part of the pump housing, this diaphragm being held seated by a spring S, which, when the oil pressure reaches the predetermined point, the diaphragm is pressed from its seating and oil permitted to by-pass. The surplus oil which cannot escape through the tube L, Fig. 3, escapes through a passage Y and enters a chamber J, the base of which is formed by the diaphragm already referred to. When the oil pressure exceeds a certain limit the diaphragm is pressed away, opening the discharge passage JI, and the oil returns to the point M whence it enters the oil pump, so that there is a constant short circuit, if it might be so expressed, within the pump itself, and which is all regulated by the diaphragm.

## Another Phase of It

An interesting feature in connection with the Maxwell oiling scheme of the motor is that the oil to the different cylinders is delivered to a groove at the bottom of the cylinder, and into this groove the bottom of the piston dips at the lower end of each stroke. The oil picked up by the piston from this groove is then distributed over the cylinder surface. The overflow oil from this groove supplies the splash within the crankcase, which furnishes lubricant for the

crankshaft and connecting rod bearings.

On the Schacht two-cylinder car the mechanical oiler type of lubrication is shown, and is illustrated in Fig. 4. By way of introduction it will suffice to say that this car uses a horizontal two-cylinder opposed motor, with the cylinders mounted longitudinally immediately in rear of the radiator. In the oiling system of this car six leads issue from the lubricator L, two of which, 1 and 2, pass direct to the main bearings of the connecting rod, two others, 3 and 4, lead to the cylinder walls and the remaining, 5 and 6, direct their oil against the connecting rods. This is a conventional oiling system as used on many two-cylinder cars. The excess oil from all of these leads supplies the splash level in the crankcase.

On the new Everitt car, what is known as the vacuum oiling system is fitted, and illustrated in Fig. 6. In this system the lower half of the crankcase serves as an oil container, and a constant oil level is maintained to lubricate all the working parts of the motor by splash. It is in conjunction with maintaining this oil level that the vacuum system is used. In brief, the vacuum system compares favorably with an inverted water bottle as used in many office drinking fountains. A supply of oil is car-

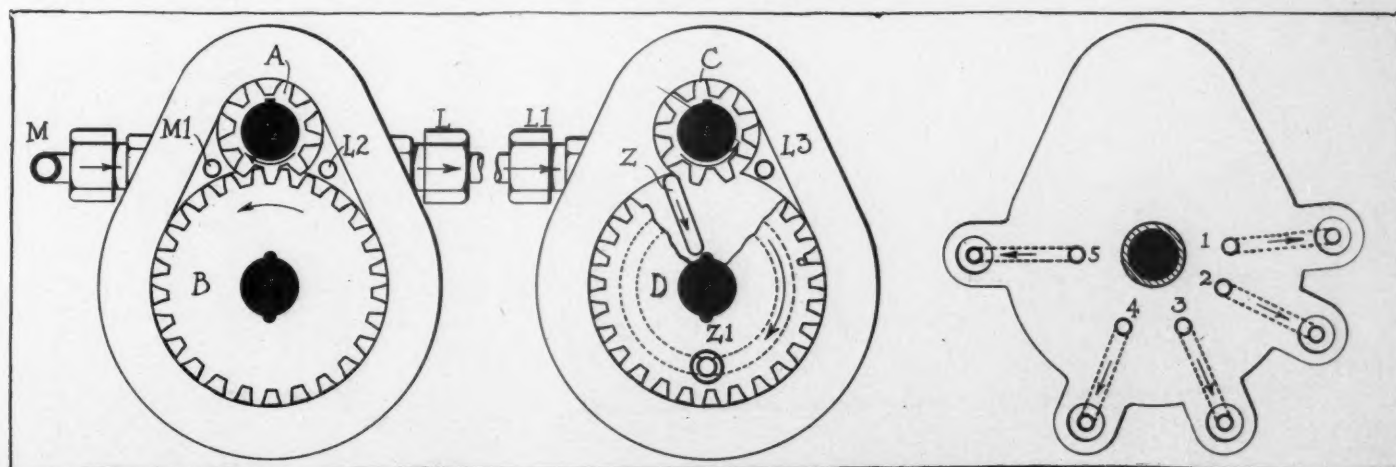


FIG. 5—PARTS I, II AND III OF NEW MAXWELL DOUBLE GEAR OIL PUMP

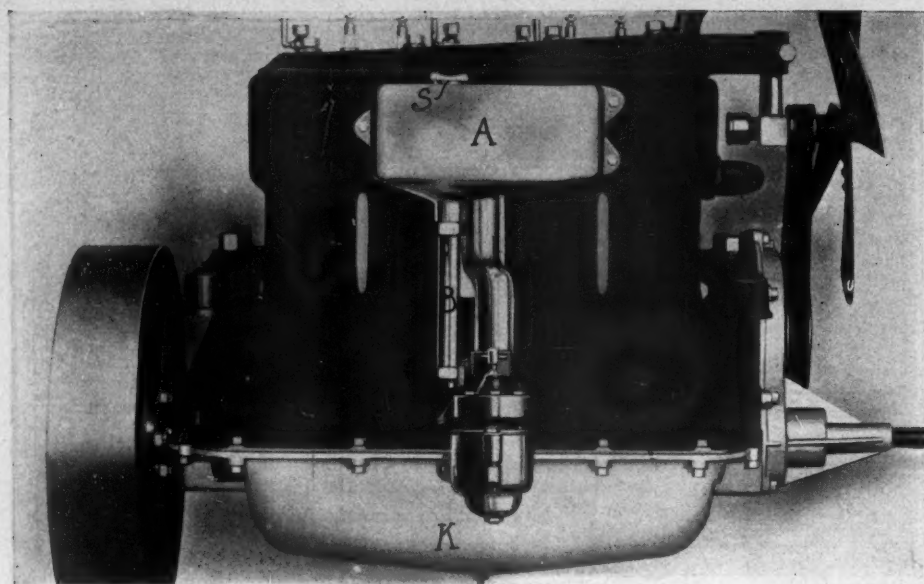


FIG. 6—OILING ARRANGEMENTS ON EVERITT MOTOR

ried in an auxiliary tank A on the side of the motor and from which through a feed pipe B the oil flows through the upper half of the crankcase to the lower half of the case, to a point determined by actual experiment which is the desired level for maintaining an oil level at. As the opening at the bottom of the pipe B becomes uncovered the air bubbles up through this pipe to the auxiliary reservoir A, thereby allowing a fresh supply of oil to flow from the tank A into the lower half of the crankcase. An automatic ball valve is operated by a stem attached to the under side of the stopper and which valve closes the pipe through which the oil runs into the lower half of the case. This valve is closed when the stopper S is removed for filling the auxiliary reservoir A, so that no oil flows into the crankcase when air is admitted to the tank A. This auxiliary tank contains  $\frac{1}{2}$  gallon of

oil, a supply claimed to be sufficient for 300 miles of road work. The reader will at once recognize that in this system of lubrication there is no moving part in connection with the oiling system; there is no mechanical oiler with its bank of pumps; there is not even the simple gear or plunger pump used in the circulating oil systems; but, on the contrary, there is nothing but a reservoir through which oil flows to maintain a level in the crankcase.

#### Black Crow Scheme

The Black Mfg. Co., in its Black Crow car models, uses a crankcase-contained system for lubricating the motor. In the motor used on its model C, D, E, and F, which has  $3\frac{7}{8}$ -inch bore and  $4\frac{1}{2}$ -inch stroke, the motor is of that type using a continuous waterjacket, but having separately-cast cylinders. The oiling system on this motor is roughly illustrated in Fig. 10, which shows

the base of the crankcase. On this motor the crankcase is made in three horizontal sections, the top one forming the base to which the cylinders bolt, and between which and the middle section the five bearings of the crankshaft are carried. This leaves the third, or bottom part, shown in Fig. 10, solely as an oil well, in which splash system is maintained. This part is divided into four compartments, 1, 2, 3, 4, and into each the respective connecting rods dip. A plunger oil pump P takes the oil from a compartment or reservoir R incorporated with and beneath the four compartments seen in the illustration. The oil, thus taken by the pump, is delivered through the copper pipes, secured to the inside of the crankcase, to the four compartments in which the predetermined level is maintained and from these, through an overflow, all surplus oil is returned to the reservoir R. There is thus a complete circulating system with the usual filtering process between successive circuits of the oil. In the models L and M Black motor, with its cylinders cast in pairs a similar oiling system is used, excepting in that the oil pump is a gear one instead of the plunger type. This gear pump delivers oil to copper pipes within the crankcase to its four compartments.

What may be styled as a conventional circulating system is used on the motors of the Great Western Automobile Co. and the Elkhart Motor Car Co., Fig. 7, sufficing for either make. The oil in these is carried in a 2-gallon reservoir R, which is corporate with the lower part of the crankcase. The external oil pump P draws the oil from this compartment and delivers it to a lead L to the crankcase proper, whence it maintains a level in the four compartments C into which the connecting rods dip. By means of the overflow pipes H, of which there are two, the oil finds an easy return passage to the reservoir R and the desired oil level for

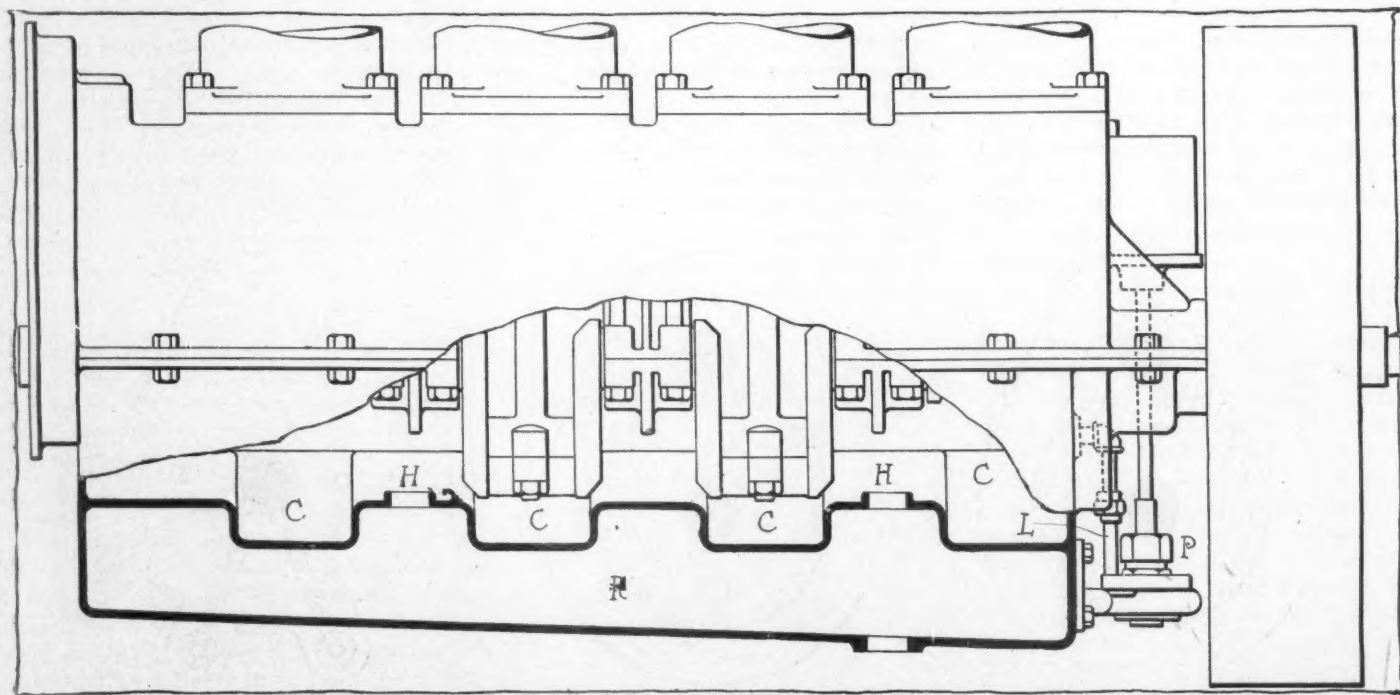


FIG. 7—CIRCULATING LUBRICATION SCHEME ON GREAT WESTERN MOTORS



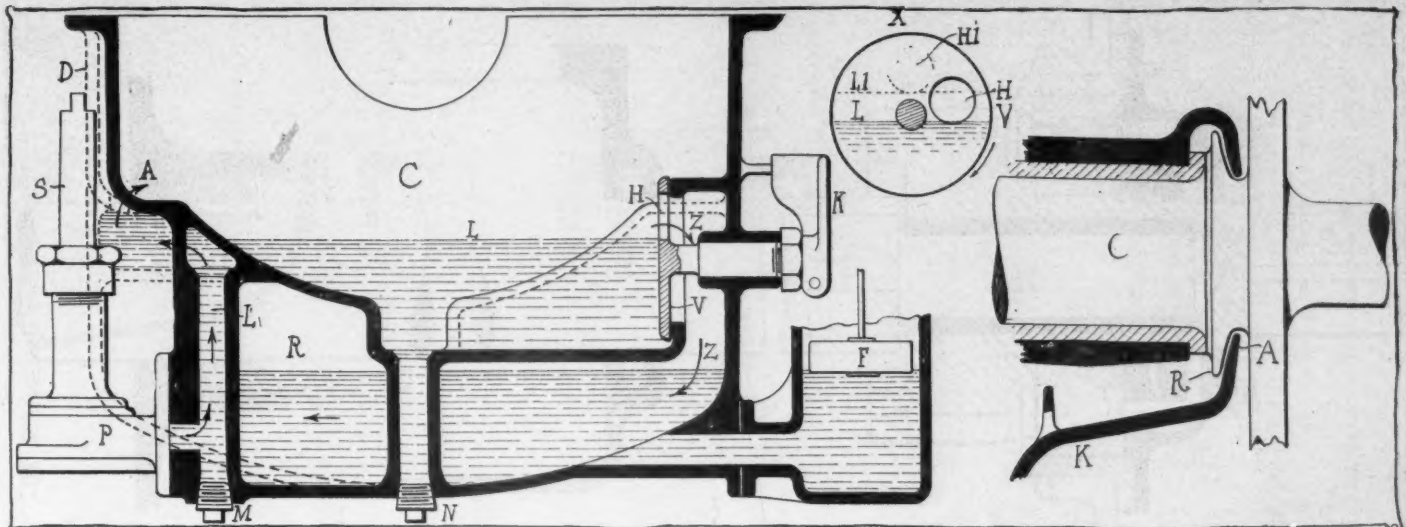


FIG. 8—PULLMAN CIRCULATING OILING SCHEME

FIG. 9—PULLMAN NON-LEAK SCHEME

the connecting rods is also maintained. Last year the Great Western motors made use of a mechanical oiler, whereas on the Sterling motors a plunger-pump type was used, which has been superseded by the centrifugal type illustrated herewith. The usual precautions are made for the prevention of the escape of lubricant past the ends of the crankshaft.

## Pullman Idea Novel

Considerable novelty is shown in the circulating system used on the Pullman cars, built by the York Motor Car Co. This circulating system was introduced 1 year ago. Fig. 8 shows an end section of the lower part of the crankcase C with a special oil compartment R integral with and beneath it. For the convenience of the readers, it will suffice to say that this oiling system is a splash level L, maintained in the crankcase proper and into which the connecting rods dip, forming a splash that takes care of all the moving parts of the motor, including the crankshaft, connecting rod and wristpin bearings, together with the cylinder walls. The oil pump P is a conventional gear one, located outside of the crankcase and driven through the vertical shaft S. It draws its oil supply from the reservoir R and delivers it to the lead L cored within the crankcase and finally into the crankcase proper following the course of the arrow A the entrance to the crankcase being shown by the dotted portion of the crankcase C. the entrance to the crankcase being shown a valve V in the side of the case, and which valve has one circular opening H through which all overflow oil escapes, as shown by arrow Z, returning as it does to the reservoir R. The valve V is under control of a handle K on the outside of the crankcase, this handle working on a serrated quadrant which holds it at any desired place. By means of this valve the oil level L can be varied in each of the four compartments of the crankcase. How this is done is illustrated in the view of the valve shown at X. It will be seen that as the valve V is rotated in the direction of the arrow, the circular opening H is lowered and consequently the oil level lowered. The highest oil level pos-

sible will be at LI, at which time the opening H in the valve is indicated at HI. This is one of the few types of controlling valves fitted to cars and by means of which the oil level can be varied from the outside. Another commendable feature in connection with this motor is a cork float F carried in a separate compartment at the side of the crankcase. From this float rises a vertical stem which, on its upper end, is graduated and moves within a glass gauge, so that the operator of the car can know at any time the height of the oil level. Drain plugs N and M are furnished, the former for the purpose of cleaning the coreway L and the second for draining the crankcase compartments.

## Prevents Oil From Escaping

In the Pullman car the usual means are taken to prevent the escape of lubricant from the ends of the crankshaft, as well as the shafts to the gearset. Fig. 13 shows method adopted at the front end of the crankcase. A packing P is used, and this is in turn held in place by a packing nut N, so that the possibilities of oil traveling out through the end of the case in the direction of the arrow are greatly reduced. At the rear end of the crankcase, Fig. 9, a different scheme is used, namely, that of turning a large diameter ring R on the crankshaft,

and providing the crankcase K with an apron A, whereby the oil thrown off at the periphery of the ring R is caught in the apron and returned to the crankcase proper.

This method of preventing the escape of lubricant is a popular one with scores of car manufacturers, and operates on the principle that owing to increased speed of the periphery of the ring R, as compared with the speed of the crankshaft C at its surface, all oil is thrown from this ring by centrifugal force. It will be noted that no system of packing for the ring scheme is adopted. Fig. 11 shows the front end of the gearbox of the Pullman cars, S showing the short shaft for coupling with the clutch, which shaft also carries the master pinion, P, of the gearset. H is the reduced end of the main shaft of the clutch and has its bearing in the hollow pinion P. Owing to the use of ball bearings the prevention of lubricant escaping is confined to the packing, A, and whatever oil is absorbed in this packing has an opportunity of escaping through the opening, B, at the under side of the shaft.

## A Chalmers Idea

Fig. 15 shows the method of preventing the escape of lubricant from the gearbox of the Chalmers 40 cars. It will be noted at

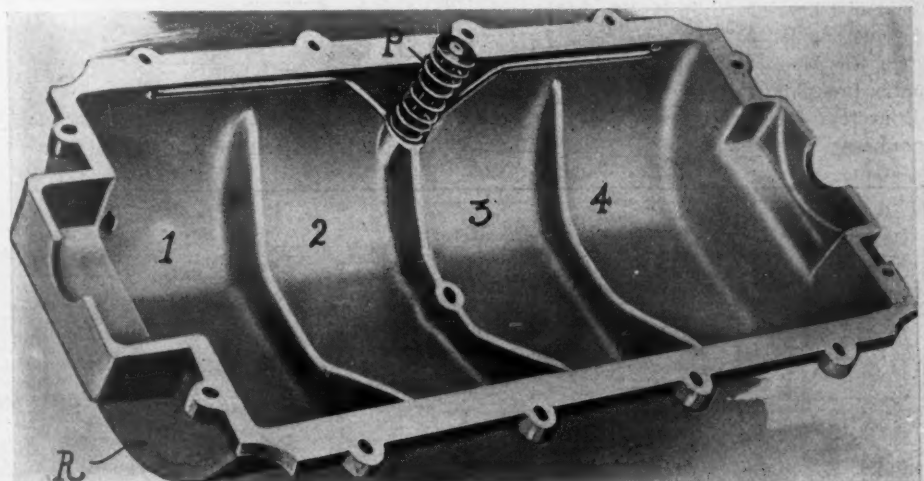


FIG. 10—CRANKCASE WITH OILER ON BLACK CROW MOTORS

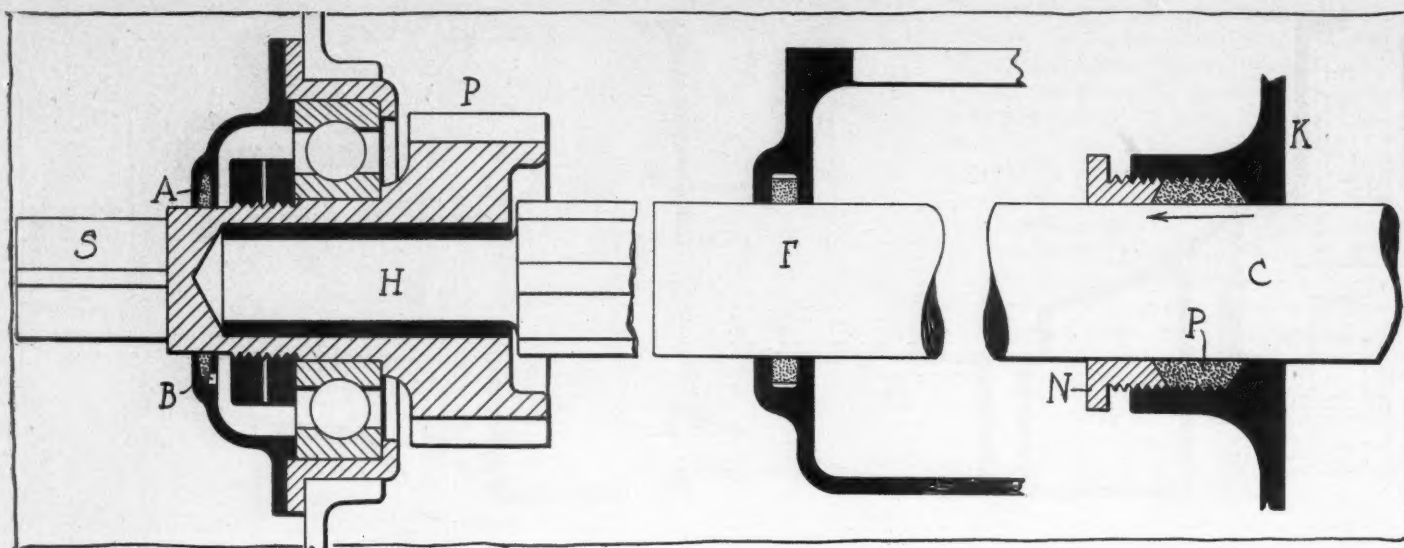


FIG. 11—PULLMAN GEARBOX PACKING

FIG. 12—MOON OIL PACKING

FIG. 13—PULLMAN CRANKSHAFT PACKING

either end there is a packing, F, which is held in place by a nut or ring, R, which compresses the packing against a bevel shoulder of the transmission case. This is the customary method of preventing lubricant escaping from the gearbox.

Two systems of oiling are in use on the Moon cars. That employed on model 45, which is the original Moon model, with the valve-in-the-head motor, consists of a mechanical oiler which for this year is placed under the hood and driven by spiral gears from the camshaft. This oiler has eight feeds and furnishes oil to all bearings and to the four cylinder walls. On this model Fig. 19 shows how the lower connecting rod bearings are lubricated, K shows the lower end of the connecting rod and C the crankshaft. To the throw of the shaft is attached an eccentric ring oiler, E, which gets its supply of oil from the main bearing, M, of the crankshaft. By centrifugal force the oil which collects in the ring, E, finds the entrance of the duct, D, which is cored in the crankpin and leads to the connecting rod bearings. The main bearing, M, gets its oil supply through a pocket, P, in which the splash is collected. The ring oiler, E, in addition to the oil which is received from the overflow of the main bearing, collects splash through the opening H.

On the Moon model 30 the new T-head motor brought out this year, a circulating oil system is used, a gear pump in the crankcase reservoir delivering the oil to

the three crankshaft bearings. A pressure gauge on the dash together with a pressure regulator under the center bearing of the crankshaft are the two means of insuring the maintenance of an oil level in the crankcase proper. Fig. 20 shows the rear end of the crankshaft on both Moon models, illustrating as it does the integral oil ring, R, on the crankshaft as well as the return channel, C, by means of which all oil is prevented from escaping past the end of the bearing. Fig. 12 shows the front end of the crankshaft on both models and in which the felt washer, F, prevents the escape of lubricant.

#### Prevents Gearbox Leaking

Fig. 14 shows the precaution taken at the forward end of the gearbox in Winton cars to prevent leakage. This consists of a

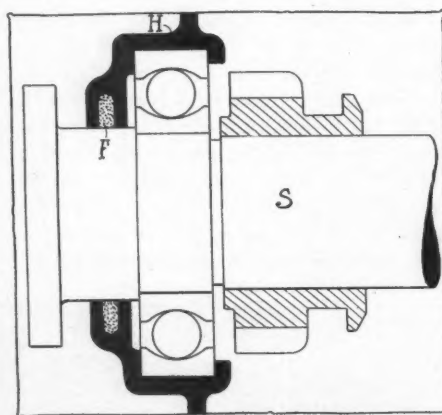


FIG. 14—FRONT END WINTON GEARBOX

felt washer, F, imbedded in a receptacle in the gearbox housing, H. The mainshaft of the gearset is indicated at S. The precautions taken in connection with oil leakage from the rear axle are illustrated in Fig. 17, in which S shows the short pinionshaft which connects by universal joint to the propellershaft. This pinionshaft is carried on two races of roller bearings and the lubricant is prohibited from escaping at the forward end by a packing, F, secured in a special retainer, D, which is in turn held rigidly in place.

The care taken by many manufacturers to prevent oil leaking from the motor, gearbox or rear axle, is noticeable in many makes of cars. A few examples of this will suffice: Fig. 16 shows the front end of the crankcase of the Knox cars with an extension apron forming a bearing for the starting crank. The leakage of oil from the crankcase proper is avoided by the packing, F, and a steel washer, W, which is used to hold this packing in place.

Fig. 18 shows the care taken in connection with the rear bearing of the crankshaft on Thomas cars for 1910. Above the bearing is a large pocket, P, in which the splash is collected, and from this two openings, H, one at each end, lead into the bearing, so as to insure a distribution of oil throughout the entire length of the bearing. A conventional integral ring R on the crankshaft prevents oil escaping, the oil being thrown by centrifugal force from this ring and returned through the channel, C, to the crankcase.

#### Rider-Lewis Scheme

A circulating system is used on the Rider-Lewis models. The crankcase pan is provided with two basins, or reservoirs, into which the oil is thrown by the centrifugal vane on the crankshaft. From these basins, above the desired oil level, large grooves convey the oil to each connecting rod trough, where it is picked up. As a provision against excess lubrication each trough is supplied with an outlet or overflow pipe with an orifice in the same plane

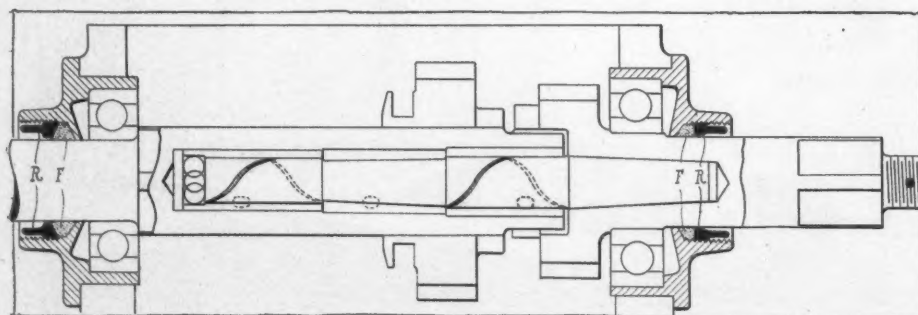


FIG. 15—CHALMERS PACKING TO PREVENT LEAK IN GEARBOX



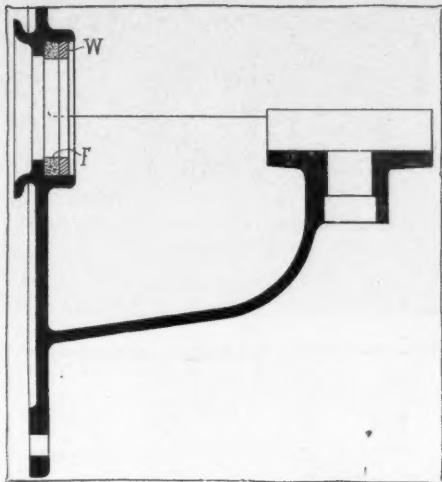


FIG. 16—KNOX PACKING SCHEME

as the oil level. Through this overflow the oil is returned to the circulation pool, whence it is ready for recirculation. On the end of the crankcase is a glass bull's eye which shows the oil supply in the motor.

On the line of Fuller cars, made by the Fuller Buggy Co., two systems of lubrication are used. On the new 30-horsepower car, which is a four-cylinder mono-block motor, a circulating system is used in which the gear oil pump is located in the crankcase and maintains an oil level into which the connecting rods dip. On the two-cylinder Fuller cars a mechanical oiler with adjustable sight feeds is located above the crankcase and, as customary with motors of this type, delivers lubricant to the cylinders, connecting rods and crankshaft.

On the new R. A. C. car, built by the Ricketts Auto Works, a circulating system is used, in which the lower part of the crankcase contains a 4-gallon oil reservoir from which the oil is circulated in the usual pump system.

On the two-cylinder Monitor cars a mechanical oiler is made a corporate part of the crankcase cover. Within this is a pump mechanism which delivers the oil to

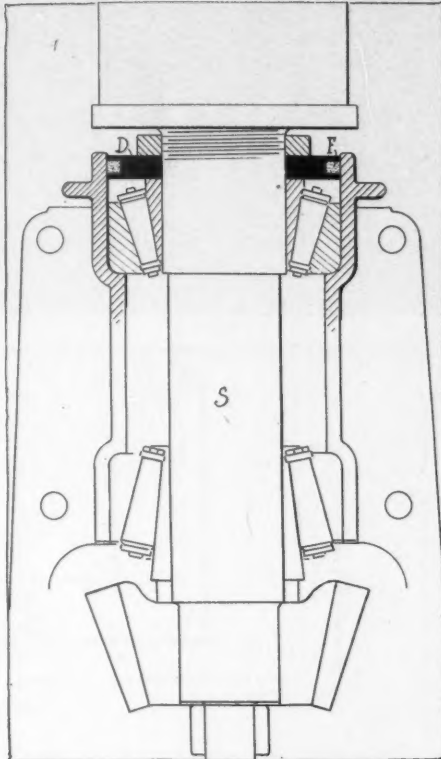


FIG. 17—PACKING ON WINTON AXLE

the crankshaft bearings and also to the connecting rod.

The Richmond cars, manufactured by the Wayne Works, use on the four-cylinder models a self-contained circulating scheme of oiling in which the oil from the pump in the motor base is delivered by means of sight feeds on the dash. The gear oil pump is located in an oil well in the lower part of the crankcase and the oil, after passing through the sight feeds, flows into the four crankcase compartments. The oil reservoir has a 1-gallon capacity and is furnished with accessible means for supplying or drawing off the oil.

One commendable turn in the lubrication problem of the present day is the simplification of sight feeds on the dash. Contrast the dash on a 1910 car with one

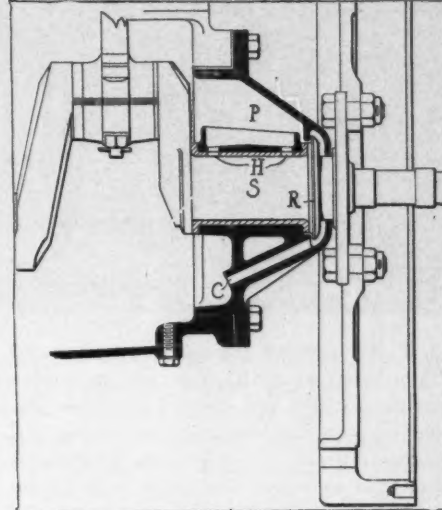


FIG. 18—REAR BEARING THOMAS CRANKSHAFT

on a 1906 product, and results will be apparent. In those days if the dash was fortunate enough not to have to carry the oiler it at least contained eight or ten sight feeds. With the passing of the mechanical oiler this multiplicity of sight feeds is past and then came the opposite extreme, some of the manufacturers using the circulating system, not considering it necessary to place a sight feed on the dash at all. They are changing from this attitude and are fitting at least one sight feed on the dash through which the oil passes on each circuit of the motor.

Viewing the entire 1910 car product, it is regrettable to say that the facilities offered by the different makers for ascertaining the oil level in the crankcase and draining off old oil from the crankcase or gearbox are not so adequate as they should be. Oil or any lubricant will not last forever, and the oftener it is changed within reasonable limits the better, consequently the maker should provide some means whereby the old oil can be withdrawn from the crankcase in a few minutes' time and without the workman having to get under the car or remove the mud apron to do so.

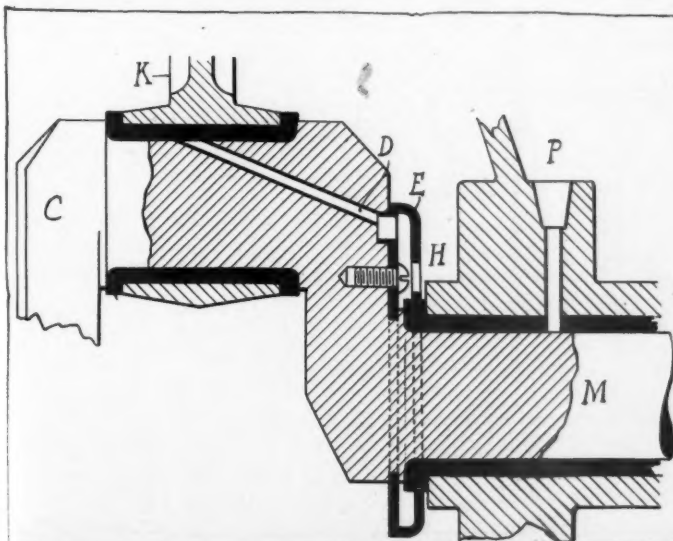


FIG. 19—OILING MOON CONNECTING RODS

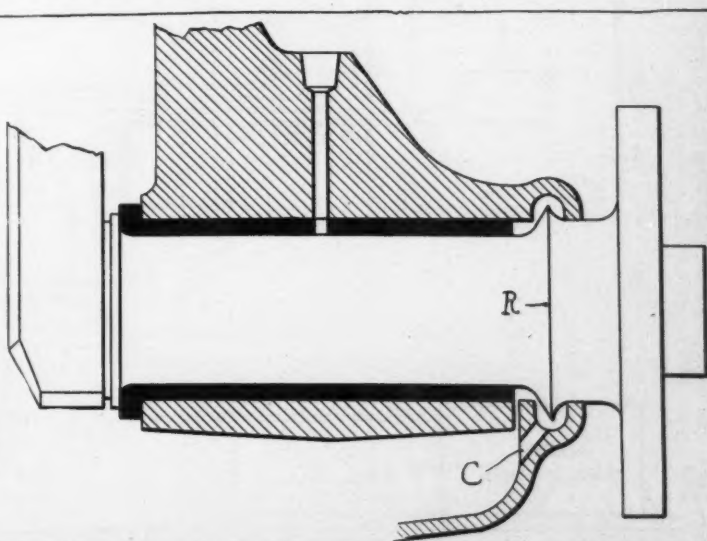


FIG. 20—REAR END OF MOON CRANKSHAFT

# Phases of Motor Car

At the present time there are several systems of ignition in use on American cars, which are divided into two distinct groups, known as jump spark and make-and-break. Jump-spark ignition is that type in which the spark is produced by making an electric current jump the air gap, of about  $\frac{1}{32}$ -inch, between the points of a spark plug, and which necessitates the employment of a very strong induced or high-tension current; whereas in make-and-break methods the spark is produced by mechanically or magnetically making and breaking the low-tension current of a primary circuit in the explosion-chamber of the motor.

In the jump-spark group, there are the single systems, where only one set of dry-cells, a storage battery or a low-tension magneto is used in connection with a coil and timer; and that in which merely a high-tension magneto is employed. Then there are dual systems, which are identical with the above-mentioned single ones except that two independent sources of current are furnished, only one of which can be used at a time, and which are wired so that a change from one to the other may be made through a switch.

For example: One timer, one coil or set of coils, one set of plugs, used in connection with either of two sets of dry cells, two storage batteries, a set of dry cells

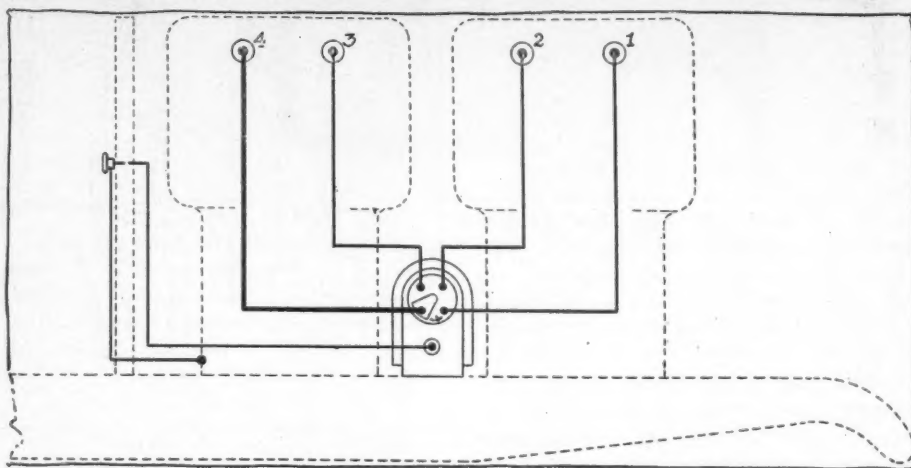


FIG. 1—SINGLE JUMP SPARK IGNITION SYSTEM WITH H. T. MAGNETO

and a storage battery, a set of dry cells and a low-tension magneto, a storage battery and a low-tension magneto, or two low-tension magnetos. Then there are the double systems, which, as the name implies, are composed of two complete single systems, either one of which or, as in many cases, both, may be used at one time.

There are just two representatives of make-and-break ignition, the mechanical and magnetic, both of which derive their current from low-tension magnetos and which are described and illustrated later. In order to understand the following dia-

grams a knowledge of electricity is unnecessary to make clear the wiring of the several ignition systems now employed in modern motor car construction.

## The Water and Piping

One similarity is extremely useful to remember—electricity and wiring resembling water and piping. The wire might be likened to the hole in the pipe and the insulation of the wire to the walls of the pipe. Electricity, then, is spoken of as flowing through a wire as water through a pipe. Suppose we have a tank of water, and a line of pipe having both ends con-

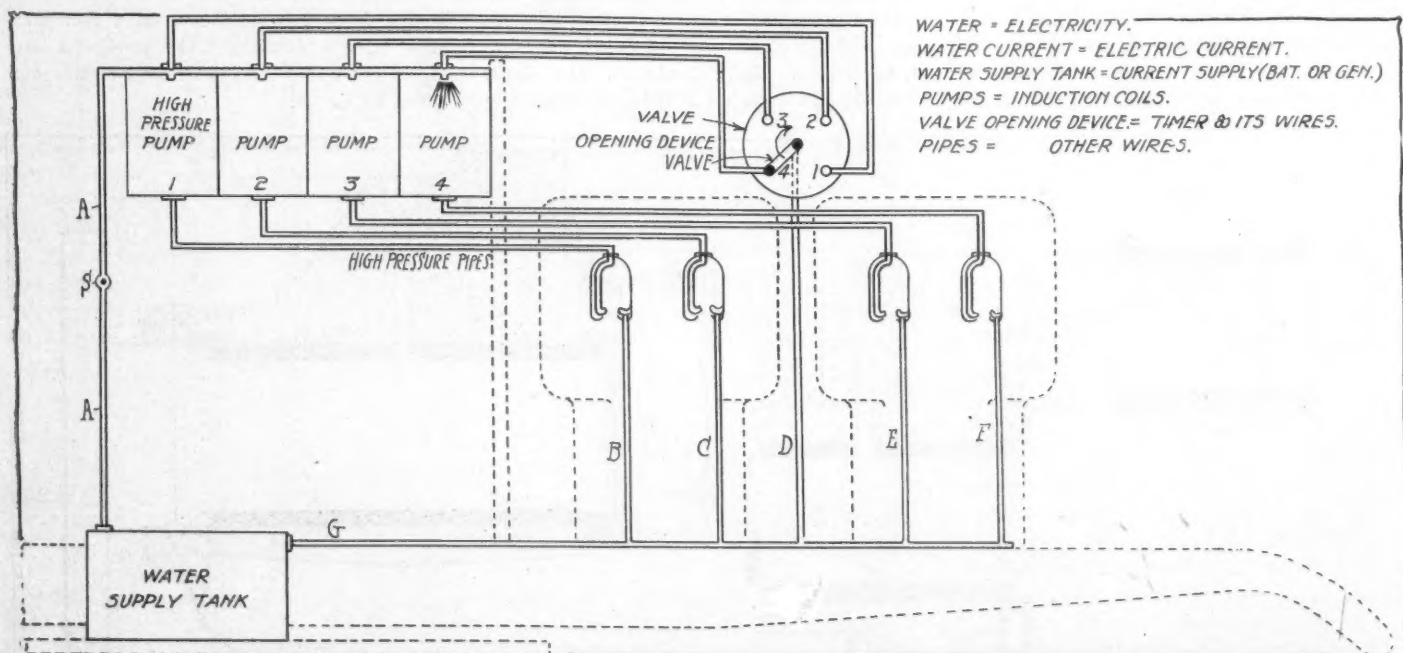


FIG. 2—A DIAGRAM IN WHICH AN ELECTRIC CURRENT IS LIKENED UNTO THE FLOW OF WATER IN PIPES



# Ignition Apparatus

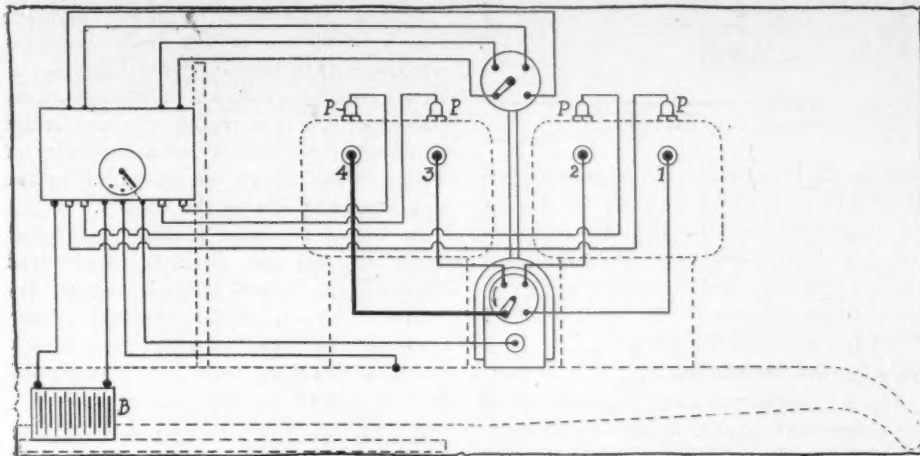


FIG. 3—A DOUBLE IGNITION SYSTEM WITH BATTERY, COIL, TIMER AND H. T. MAGNETO

needed to the tank. Means are provided for causing the water to circulate slowly through the tank and piping, as by introducing a low-pressure pump into the system or charging the tank itself with a certain amount of pressure. In an electric current this pressure is produced in a number of ways. The most common methods are by the magnetic and mechanical actions in a magneto, and the chemical action in a storage battery.

As shown in Fig. 2, Motor Age illustrates just such a system. A water tank containing a certain amount of pressure

takes the place of a charged storage battery; pipes are shown to represent the wires; and in order to further simplify matters, high-pressure pumps represent the induction-coils; a valve-opening device or, as in this case, a four-way valve, is likened unto the timer, a pet-cock to a switch, and the whole system of parts disposed in due order, as in the wiring diagram of an electric ignition system.

## Tracing Current Flow

Let us now trace the flow of the water current. On opening the valve S the water flows through pipe A and its connections

to the valve opening device. As soon as the valve in this device is turned to one of the pipes the circuit is open and the water flows through and returns through the ground pipe G to the tank. This flow of water automatically puts into action the corresponding pressure pump and a strong current of water passes swiftly through the high-pressure pipe, jumps across the gap, which corresponds to that of the spark plug, and is also drained back to the tank through ground pipe G. Therefore it will be seen that as the valve, in the device, revolves, if it is properly set, intermittent squirts will take place across the appropriate gap at the proper time. There are no wires in an electric circuit corresponding to pipes B, C, E and F, the electric current being brought back to the ground wire, represented by pipe G, through the metallic conductivity of the motor.

An electric circuit is the path in which the electricity moves or, as we commonly say, the path through which the current flows. In motor ignition systems we deal with two circuits—a primary, or low-tension, circuit and a secondary, or high-tension, circuit; and the currents in each are known as primary and secondary, or low and high-tension currents respectively.

If a rod of iron or a bundle of iron wires be wrapped with a few layers of

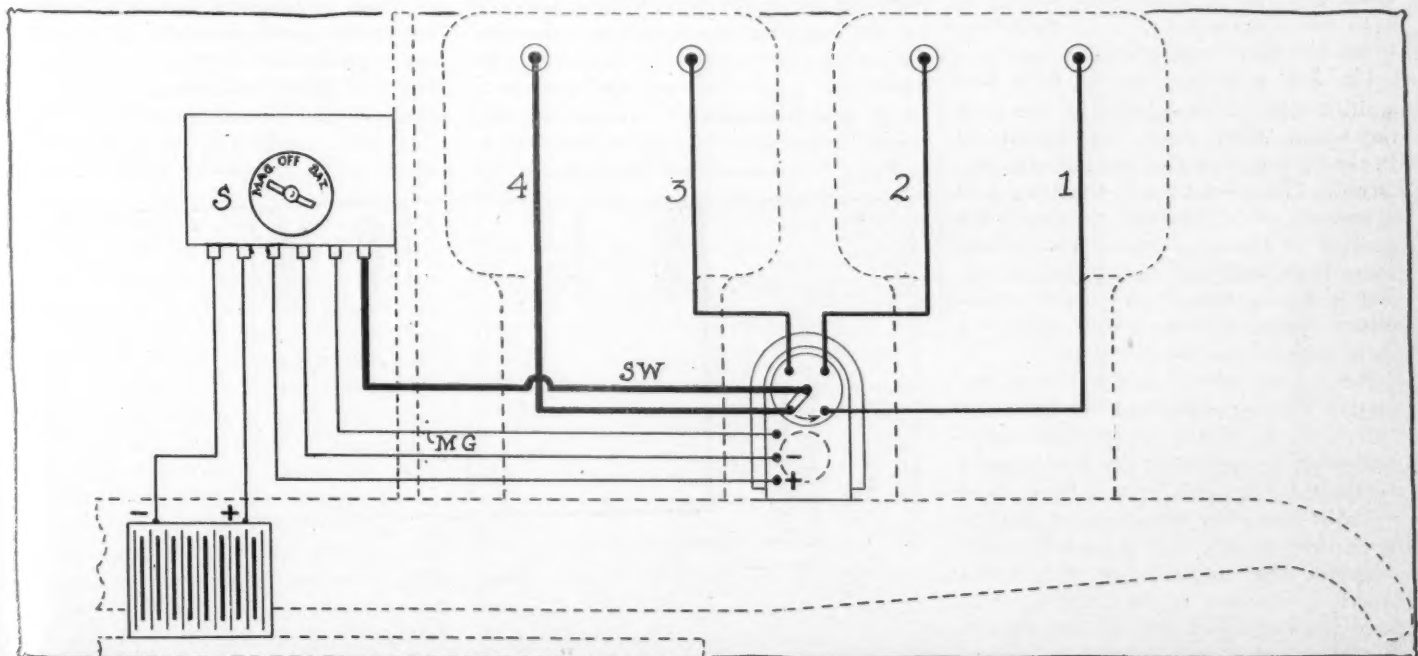


FIG. 4—A DUAL SYSTEM WITH BATTERY, SINGLE-UNIT COIL, LOW-TENSION MAGNETO, WITH H. T. DISTRIBUTOR ON MAGNETO

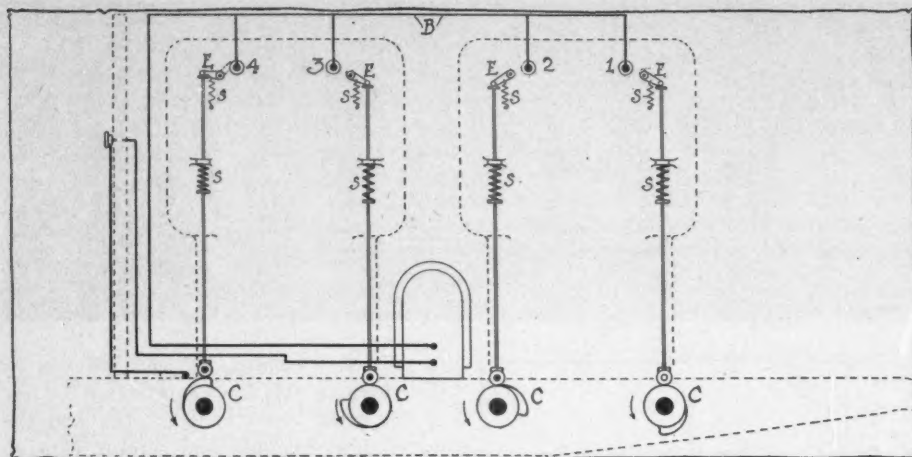


FIG. 5—MAKE-AND-BREAK IGNITION WITH LOW-TENSION MAGNETO

insulated copper wire and a current be passed through the wire, the enclosed iron rod becomes magnetic. If, insulated from and entirely disconnected from the first winding of wire, another series of wires be wrapped in layers, and a current passed as before through the first or primary layers, an independent or secondary current will be induced in the secondary winding, although there is no metallic contact between the two layers.

#### Occurs in Induction Coil

This is what occurs in the induction coil, the number of turns of wire in the primary, which is of thick wire, and the number of turns of wire in the secondary, which is of very fine wire, determining the difference in electro-motive force between the original current and the induced one, the latter often being multiplied by hundreds of thousands, and consequently having the power to overcome enormous resistance. This is the type of induction coil used for motor ignition in which the original 4 or 6 volts of the battery are transformed into some thousands of volts, the raised tension or potential then being sufficient to bridge over the resistance, which is the air gap or distance between the spark-plug points.

Fig. 7 is a wiring diagram of a dual ignition system. As shown by the position of the switch lever A on the coil box B, the current is coming from storage battery C. The other battery, C1, being held in reserve. Now directing attention to the position of the revolving contact of the timer D we will note that a primary current is flowing through coil 4 and a high-tension current is being distributed to the spark plug in the fourth cylinder.

The primary circuit in this system consists of the two wires from the battery C and C1 to the switch on the coil, whence connection is made with the four primary windings in the coil units. From these coil units four other wires connect with the timer, and thence are grounded, which completes this circuit. The high-tension circuit is confined to four wires, which leave the bottom of the coil and pass to the four spark plugs. These windings at the coil connect with the primary wind-

ings of the coil units. In a high-tension as well as a low-tension circuit there must be a complete circuit, and this is established through a ground in the coil box, it being understood that the moment the current bridges the gap in the spark plug the ground circuit is completed.

#### Dual System Illustrated

Fig. 4 represents a dual system in which a storage battery and a low-tension magneto furnish the primary current. As may be seen by the position of the switch on the coil box, the magneto circuit is complete. The motor is in operation and the current, which is generated in the magneto leaves through the positive wire, designated by the positive sign +, and flows through the primary winding of the coil and returns by way of the negative wire, indicated by the sign —. Wire M. G. is the wire which grounds the primary current before it passes through the coil and prevents a sparking at the plugs, when it is desired to stop the motor.

In this system the high-tension current from the coil is returned to the revolving contact of the distributor through the wire SW, the distributor being a corporate part of the magneto. From the four contacts of the magneto, wires 1, 2, 3 and 4 lead to the spark plug. The coil employed is a single-unit type or what, for convenience, might be designated a step-up transformer.

Fig. 1 is representative of a single jump-

spark system with a high-tension magneto. In this diagram the secondary current which is induced in the magneto is now leaving the high-tension distributor on the magneto and being conducted to the plug in cylinder number 4. The wire leading from the lower part of the magneto to the contact button on dash, grounds, or short circuits, the primary current of the magneto and prevents the induction of a secondary current.

#### Windings on Armature

In the high-tension magneto, There are two windings on the armature, a primary winding and a secondary, and a high-tension current is induced in the secondary winding, so that a transformer coil is not required. This system has a simplicity of wiring, there being but the four to the cylinders, and one to the cut-out.

In Fig. 5 is shown a single make-and-break system; the spark being obtained by mechanically making and breaking the primary current, of the low-tension magneto, in the cylinders. By pressing the button on the dash the current is conducted to the ground instead of the cylinders, consequently no spark takes place and the motor stops.

Perhaps in no other ignition system is the wiring simpler than the make-and-break of this type, the majority of makers confining the wiring to a single wire from the magneto to the buss bar B which is carried on the sides or top of the cylinders. From this it is customary to have knife switches connecting with the four stationary electrodes, 1, 2, 3, 4, within the cylinders. There are moving electrodes E which, through the presence of the cam C on a camshaft within the crankcase, it is possible to bring the moving electrodes E against their respective stationary electrodes and immediately the cam is passed springs S separate them, at which time the spark takes place. The cams C are for convenience shown at right angles to their proper position, their location being the same as cams for opening valves. In some make-and-break systems the timing is advanced or retarded by spiral cams, which can be moved endwise to vary the timing.

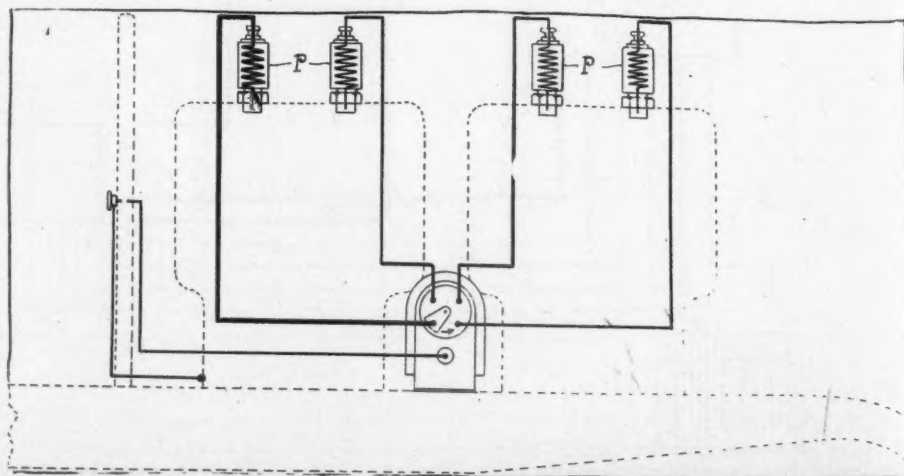


FIG. 6—A SINGLE IGNITION SYSTEM WITH MAGNETIC MAKE-AND-BREAK PLUGS



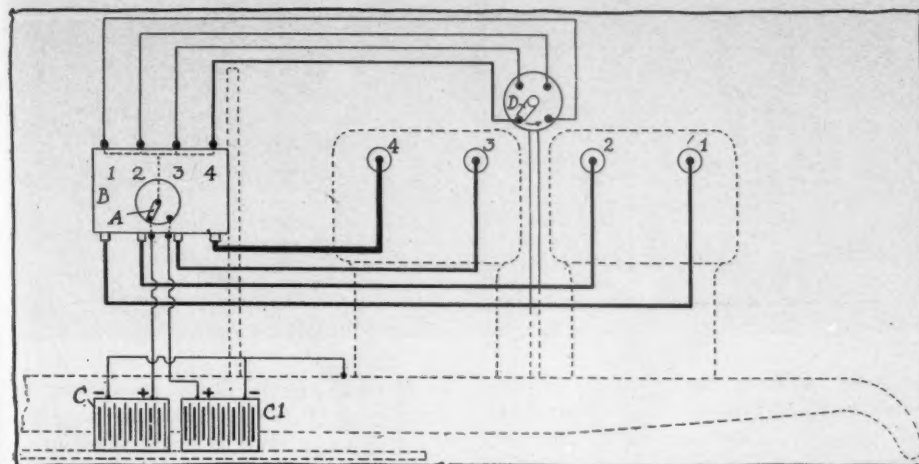


FIG. 7—A DUAL IGNITION SYSTEM WITH TWO STORAGE BATTERIES AS SOURCES OF CURRENT

Fig. 6 is a single system with a low-tension magneto and magnetic make-and-break plugs. This system resembles that in Fig. 5 except that a distributor is used on the magneto and contact is magnetically made in the plugs. In each plug is a coil winding surrounding a soft iron core, the core becoming an electro magnet to operate the make-and-break parts in the plug.

Fig. 3 is diagramatic of a double jump-spark system comprised of a storage battery, timer and induction coils, a two-way switch, high-tension magneto and two sets of plugs. As shown by the position of the switch lever on the coil-box the magneto circuit is closed, and a high-tension current is being distributed to the plug in the rear cylinder.

The wiring in the high-tension magneto circuit is limited to four leads, 1, 2, 3, 4, to the plugs in the cylinders, as well as a wire to the switch on the coil box. In the other system, the current supply is from the battery is delivered to the four primaries of the coil, whence the circuit is continued to the timer and thence grounded. The coil contains four secondary windings which unite with the set of plugs, P, located in the cylinder heads. In all double systems there are two sets of plugs, two sources of current and two complete systems of delivering the current to the plugs.

A system which is neither distinctly double nor dual, is shown in Fig. 8, and for want of a better title it is styled a double dual system. It is a double system, inasmuch as there are two independent systems of current; but, as there is but one set of plugs, it is a dual system. This method of using two separate sources of high-tension current with only one set of plugs is made possible through an ingenious arrangement of the secondary or high-tension wires of both systems in a specially constructed insulating tube. The high-tension wires are attached to contacts, which protrude from the insulating tube, as designated by the dotted lines; and the tube itself is so suspended over the cylinders that it may be rocked back and forth in a manner which permits of switching the protruding contacts of either system, into connection with the plugs.

Although all the systems herein shown are now in use, the last year or two has shown a marked tendency towards standardization along certain lines, and marked preference seems to be shown in favor of dual systems, in which the sources of current are a set of dry cells for starting purposes, and a high or low-tension magneto for general ignition, after the motor is put in operation. In the double systems now in use a storage battery is generally furnished as an auxiliary source of current instead of drycells. This preference for the storage battery in the double systems being most probably due to the fact that the double systems are, in the majority of cases, found on the higher priced cars.

That the magneto is now regarded as of the first importance can be taken for granted, which point is adequately illustrated in numerous of the motor cars to be seen at every hand. In one case the magneto is built into the flywheel, thus forming a part of the motor, as it were. In many of the important products the magneto is regarded as a finality, if a dual system is used, and in many cars the magneto is considered adequate for the purpose, irrespective of the fact that a dual system may be provided. In other words, the time has passed when it will be proper to consider the magneto in the light of an auxiliary to the coil system. It is the coil system that has reverted to the

second place in the onward march of ignition systems.

If the magnetos have advanced in utility it is equally true that the coil systems have made strides also. In the old days coils were not quite up to a fitting standard. Primarily, because the bundle of wire in the magnetic circuit was not of a high magnetic permeability. The lag of the spark was not at a constant rate, and the same lag was overmuch. The result was that the regulation of the spark was beyond the ability of the operator of the car, unless at the low speeds of the motor. Maximum power of the motor could not be expected under such conditions, nor was it realized with any considerable margin.

But the fundamental principles on which they are constructed and operate are generally the same in the majority of cases. As to the materials used in the makeup of the various types of magnetos, it is enough to say that they are good enough to well serve the purpose, and from the point of view of the users of cars it would be a task to try to discriminate. The makers of cars can be relied upon to keep an eye on this phase of the question since it is to their advantage to see to it that the magnetos they use are provided with the proper materials in the proper place. On the whole the magneto situation is on a very firm basis, leaving little to be desired. It is needless to say, however, that the magnetos are not the only part of the ignition system in which vast improvements have been made. Coils, tremblers, batteries and electrical conductors, terminals and fastenings, have all come in for a fair share of improvement and have reached a high state of efficiency. The non-synchronism of the four-unit type of coil with individual vibrators has been brought to time through the advent of the master vibrator. New materials and alloys, and improvements in the construction are to be seen in the tremblers, changes have been wrought in the construction of batteries which have greatly enhanced their capacity and reliability, and many ingenious improvements are to be found in the construction and application of conductors, terminals and fastenings.

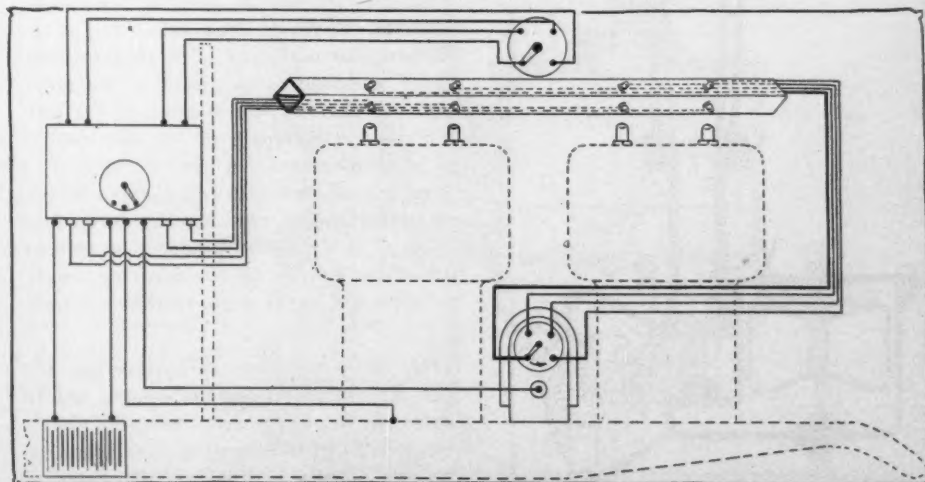
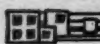


FIG. 8—A DOUBLE DUAL IGNITION SYSTEM ONCE USED ON CARS



# Carburetor Ideas

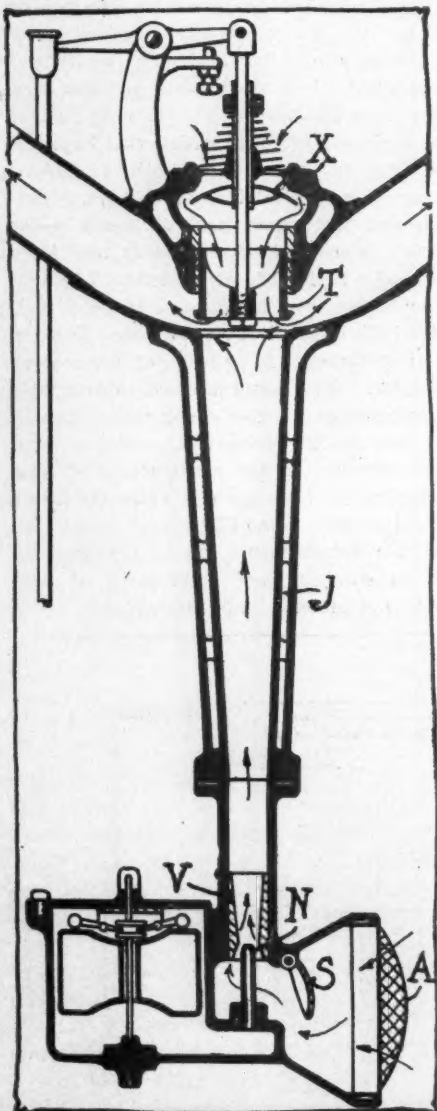
ONE of the noticeable trends of the year is the adoption of stock carburetors by many of the old-time manufacturers who heretofore have used their own make of carburetor. There are, however, a good representation of those who still use their own carburetors and who are improving them in minor details from year to year. Among the list of those who still use their own make of carburetor may be noted such concerns as Stearns, Winton, Packard, Peerless, Pierce, Franklin, Garford, Maxwell, Locomobile, and a few others. Among those who might be designated manufacturers' carburetors, there is considerable variety of design, some like the Stearns and Winton using the double-

jet type, whereas the majority of the others continue with the single-jet variety. One notable change in several of these carburetors is the additional attention given to waterjacketing, the Packard and Peerless cars setting a high-water mark in this respect in that the vertical part of the manifold from the carburetor to the branching pipes to the twin-cylinder castings is waterjacketed. With these car builders who make their own carburetors the auxiliary air valve in one form or another has become practically as accepted a construction as it has with those makers who build carburetors by the tens of thousands.

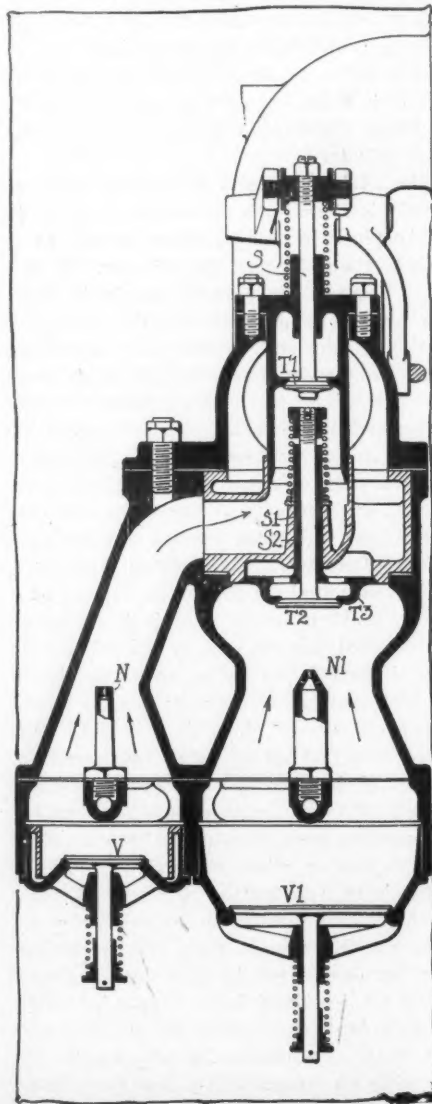
The Peerless carburetor for this season has been quite modified as compared with former types and is a very simple construction. Its leading characteristic is that the throttle, T, is now located above the carburetor and where the manifold branches to the front and rear cylinders. This throttle is of the plunger-valve type and its opening and closing is accomplished by a rocker-arm action comparable with that used in a valve-in-the-head motor. Still another interesting point in this carburetor is the location of the auxiliary air valve, X, directly above the throttle, so that the auxiliary air passes through the hollow throttle, the air mixing with the mixture as shown by the arrows. The auxiliary air valve is under the control of a conical spring, this type of spring giving a compound action in that the larger-diameter coils compress first. A still further change in this carburetor is that the nozzle, N, is now placed vertically and located directly at the base of the intake manifold, the tip of the nozzle being at the smallest diameter part of a venturi bushing, V, inserted in the base of the manifold. To prevent condensation of the mixture the vertical part of the manifold is waterjacketed at J. A starter valve, S, is fitted and is simply a swing valve which, when held closed, restricts the normal air opening and thereby produces a greater pull on the gasoline in the spraying nozzle. The main air intake is guarded by a screen, A.

The two-jet Stearns carburetor has not been altered much for the coming season except in that its capacity has been slightly increased by enlarging the passages. The two nozzles in this are designated N and N1, the former for low speed, the lat-

ter for high speeds. Both are located in venturi-shaped mixing chambers and the air entrance to them is under the control of poppet valves, V and V1, both controlled by springs. A progressive and what might be designated compound-throttle control is used on Stearns cars, there being in reality three throttle valves in the carburetor. For convenience the first is marked T1, and is used solely in conjunction with the small nozzle, N. The second throttle, T2, brings the large nozzle, N1, into operation. The third throttle, T3, is concentric with the throttle T2 and is opened by a still further downward movement of the stem, S, by which all three of the throttles are controlled. This triple

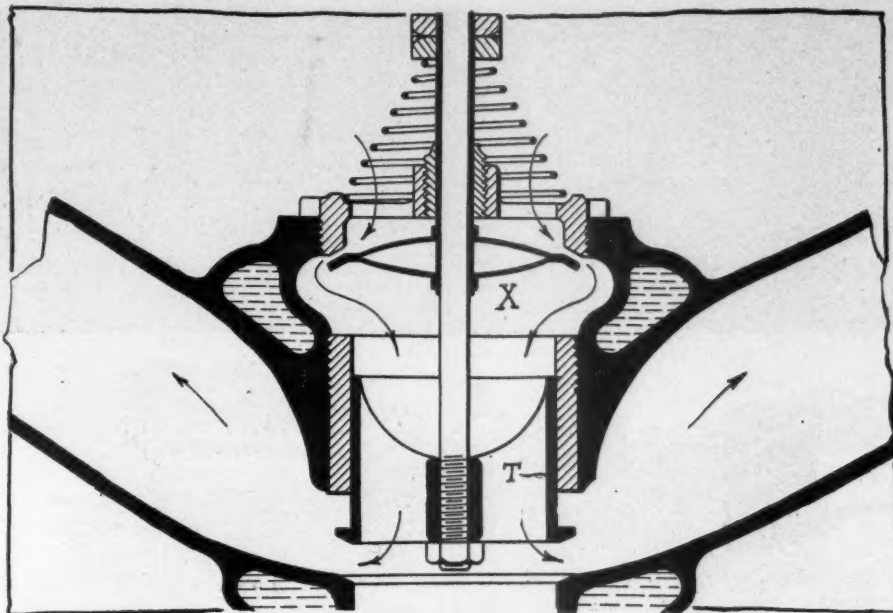


NEW PEERLESS CARBURETOR



STEARNS DOUBLE-JET CARBURETOR





THROTTLE AND AUXILIARY AIR-VALVE IN PEEPLESS CARBURETER

throttle control has been a feature of the Stearns cars for several seasons and gives a particularly wide range of motor speed. The operation of the throttle system is simple. A depression of the stem, S, opens the first throttle, T1. A still further depression of the stem S brings it in contact with the top of the stem, S1, of the second throttle. When this stem is depressed to a certain distance it bears upon the top end of the sleeve, S2, which results in a depression of the third throttle, and when this third throttle is open all three are open. When closing this throttle No. 3 closes first, No. 2 second and No. 1 last.

Since their inception the Maxwell cars have used their own make of carbureter. This carbureter is of the separate float chamber type and is somewhat out of the ordinary in that the main air entrance, A, is controlled by an air valve, V, which operates in harmony with the throttle, T, in that both are secured to the stem, S, which, when rotating, opens or closes the throttle as desired. Both the throttle, T, and the air valve, V, are vertical drums with one side cut away, and in the illustration the air valve is shown open, giving free passage to the air, which follows the course of the arrows, passing as it does the nozzle N before it reaches the throttle. The exit through the throttle is not shown, but is a horizontal opening. The air valve, V, and the throttle, T, are so set that with the throttle open the air valve is also open, and as the throttle closes there is a gradual closing of the air valve, although when the throttle is absolutely closed the air valve is not. This inter-connection between the throttle and the air valve dispenses with the auxiliary air valve as used on many cars, and at the same time it is claimed to give a positive control over the mixture, in that there is a desired uniformity of vacuum surrounding the spraying nozzle N. In the Maxwell carbureter the nozzle N is without

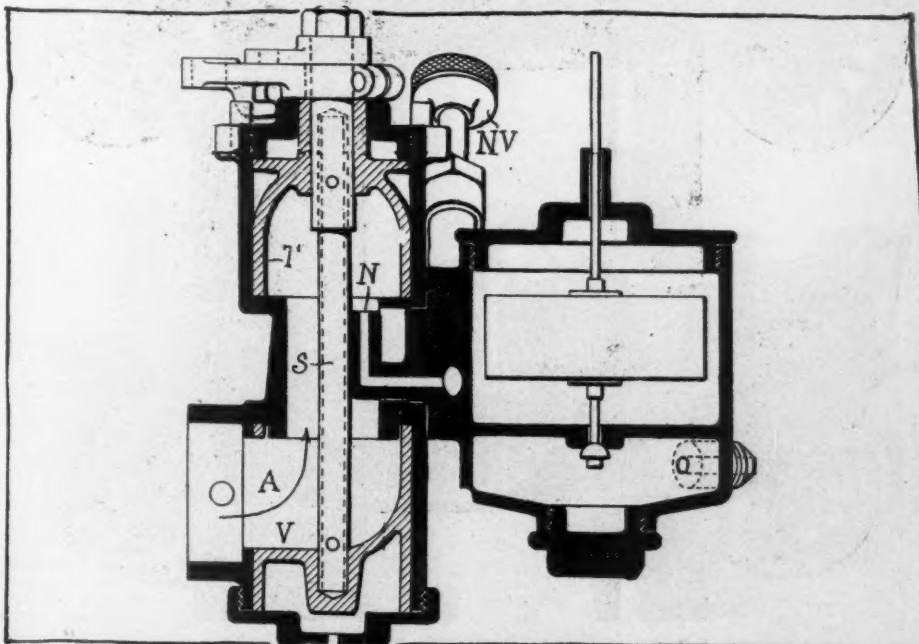
any needle valve, there being, however, a needle valve which regulates the passage from the float chamber to the nozzle. The top of this needle valve is shown at NV, where a large knurled end is provided to facilitate adjustment.

The carbureter on the Locomobile cars has been a conspicuous feature of these cars for several seasons. It is of the float-fed, single-jet type, with a nozzle not controlled by a needle valve. The automatic air valve is a conical spring, which, when the coil separates as motor suction increases, the air passes between the coils. This type of valve has been used for four seasons.

Another car with a characteristic type of carbureter is the Packard, the cardinal characteristic of which is the hydraulic governor which is connected with the throttle valve. This governor is a diaphragm in the water system used for cool-

ing the cylinders. The water pump forces the water against one side of the diaphragm; the opposite is connected by rod with the throttle; and the faster the motor runs the greater the water pressure, so that the diaphragm is bulged to one side, which, through its connection, reduces the throttle opening. Still another feature of the Packard is that the vertical part of the manifold, namely, from the carbureter to where the horizontal branches connect with the front and rear cylinders, is water-jacketed so that all possibility of condensation of the mixture is prevented. A third characteristic of Packard carburation is the control from the dash of the auxiliary air valve. This auxiliary air valve is held seated by a spring, and the tension of the spring may be varied by a sliding wedge, so that if a stiffer action is desired the wedge is inserted. A fourth Packard characteristic is the reserve gasoline supply, which is accomplished without forming any compartments in the main gasoline tank. This is made possible by a standpipe extending upwards from the base of the tank and through which the gasoline passes to the carbureter. As soon as the gasoline in the tank falls to the level of the top of the stand pipe, its flow ceases, but there still remains 3 gallons of gasoline in the tank, constituting the reserve supply. These 3 gallons can only be withdrawn by turning a control valve, which allows of the drawing them direct through the bottom of the tank instead of by way of the stand pipe.

The Pierce carbureter has not been altered during the last year. Perhaps its leading characteristic is the auxiliary air valve of the reed type, the reeds of which open uncovering ports through which the air is admitted. After each reed opens a certain distance its further opening is restricted by a curved leaf spring, the tension of which has to be overcome before any additional opening occurs.

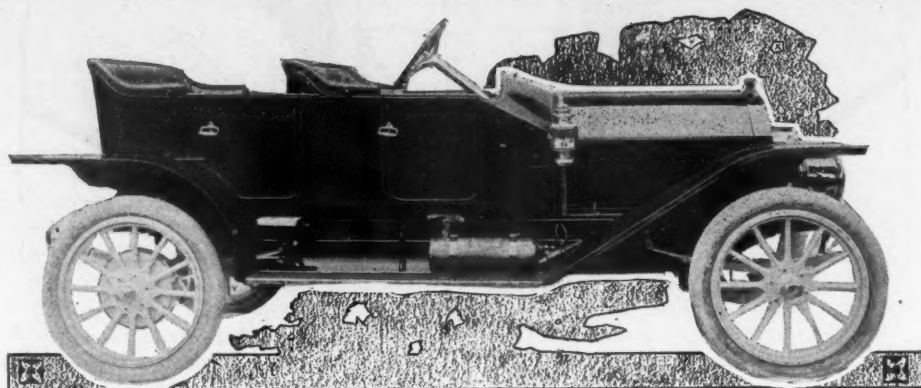


SECTION OF MAXWELL CARBURETER



**F**OLLOWING its usual custom Motor Age this year again reviews the cars which are exhibited only at the Coliseum show and were not seen at either of the New York shows. In the following pages, however, are illustrated certain types of bodies which were exhibited at either one of the New York shows but which were not illustrated at that time. Among these might be mentioned the torpedo body type used on the White gasoline car, which body is of the high-side design with a heavily hooded dash. The torpedo effect is accentuated in these models by the plain upholstery used.

The special design of Marmon torpedo, referred to in an earlier issue of Motor Age, is shown. This is perhaps the most radical torpedo design of the year. Also illustrated for the first time is the new torpedo seven-passenger body brought out by the Knox company and used on its six-cylinder chassis. Since the New York



TORPEDO-BODIED INTER-STATE. ONE OF NEW CREATIONS

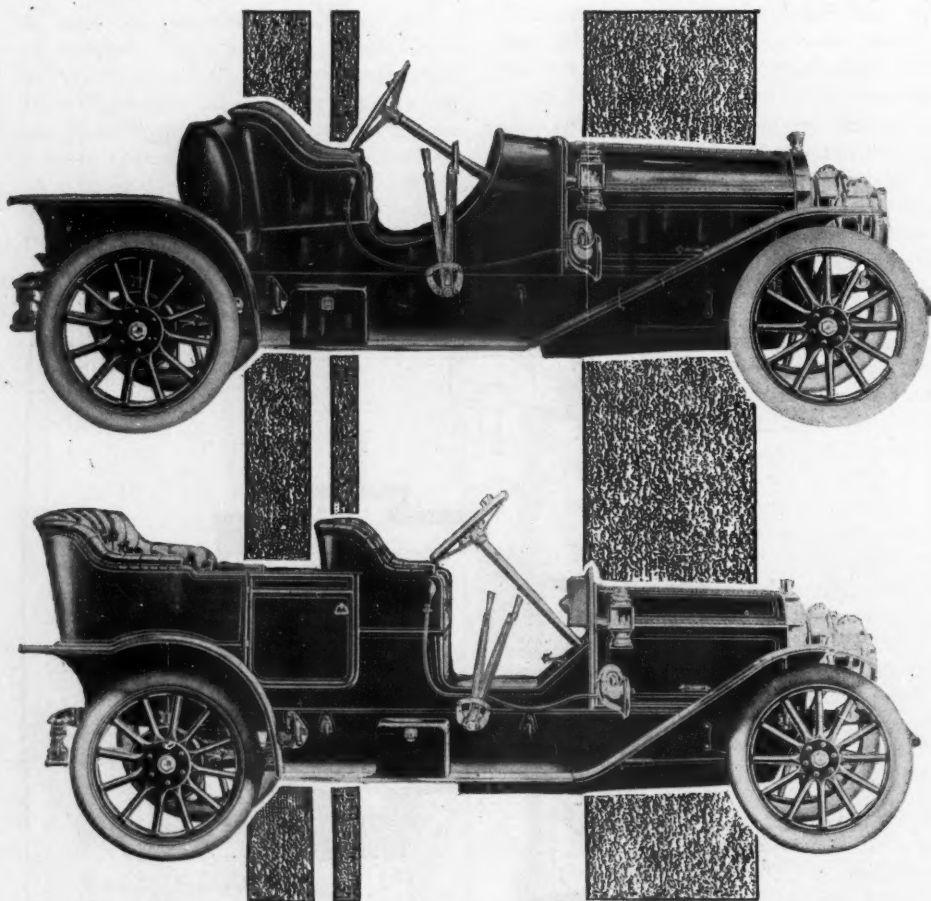
shows one or two concerns have completed their torpedo designs which were in course of construction at that time. In this category may be noted the Inter-State, illustrated on this page and which is a well-designed one. There is in this body a commendable uniformity and harmony from

the radiator to the back of the tonneau seat. The heavily-hooded dash looks a part of the bonnet and forms a continuation with the sides of the body.

Another concern which is bringing out a torpedo type but is not illustrated in these pages is the Kissel company. The torpedo design shown for the first time on Winton six-cylinder cars is illustrated herewith. Other body designs not shown heretofore in Motor Age are two Franklin types, one designated a fire chief's wagon, which is a four-seated design, carrying firemen, lanterns and small extinguishers. The other Franklin design is a torpedo runabout, the torpedo effect being restricted to the inclosure of the ends of the running boards.

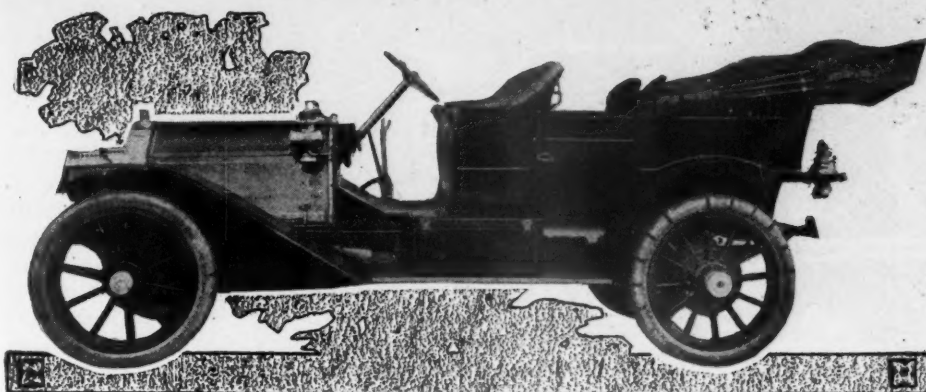
Several other concerns will exhibit body types somewhat different from those seen in New York. Among these may be noted a torpedo type brought out by the Mora company. The Columbia company expects to show an inside-operated coupe type of gasoline car. The Premier company will show for the first time in Chicago its two-passenger roadster equipped with a particularly low body and with seats comfortably tilted back. This car is fitted with large combination gasoline and oil tanks back of the seat, the gasoline capacity being 36 gallons and the oil 8. The National company expects to furnish torpedo bodies during the coming season but will not have these ready for the exhibition at the Coliseum. The American company will make torpedo bodies on special order, it is announced.

**Dorris**—A close-coupled car is new in the Dorris line, but otherwise the company is satisfied with the body types it turned out last year. The Dorris motor is of the



STERLING MODEL O ROADSTER WITH ODD-SHAPED GASOLINE TANK.  
STERLING MODEL O AS A FIVE-PASSENGER TOURING CAR OF MODERN DESIGN





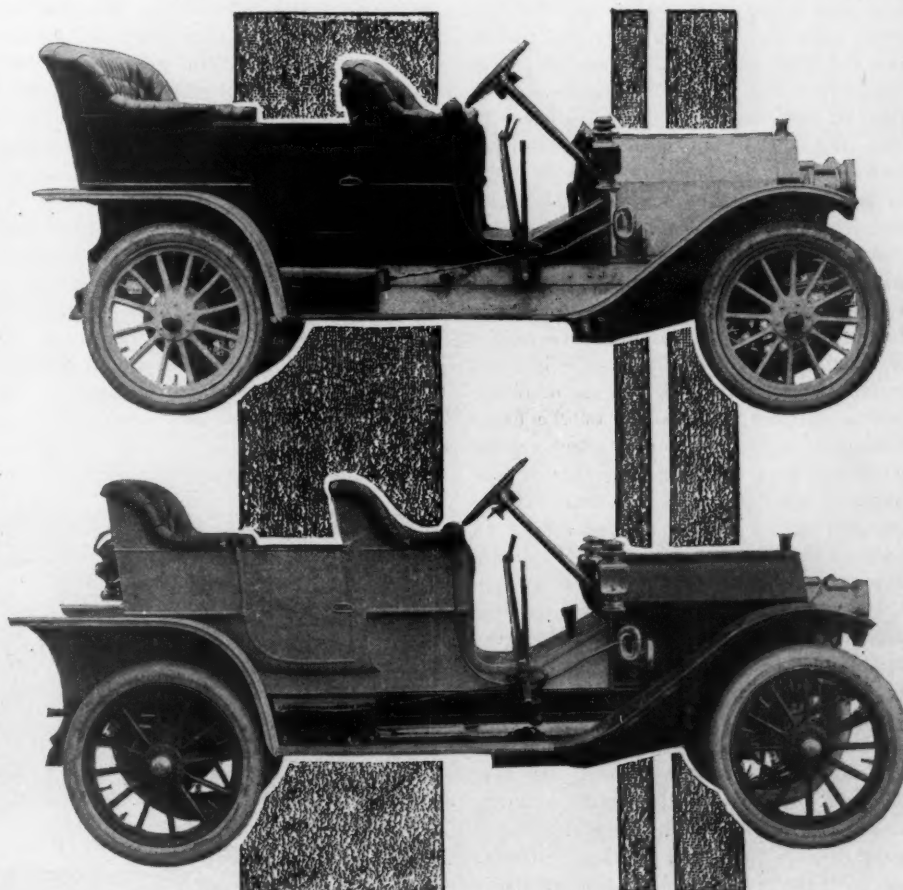
LEXINGTON FIVE-PASSENGER TOURING CAR, PRODUCT OF THE SOUTH

long-stroke type, the bore being  $4\frac{1}{4}$  inches and the stroke 5 inches. For the fifth year the valve-in-the-head construction is retained, the idea being to prevent a waste of heat and give a reduced compression area to the waterjacket, the saving of heat permitting the impulse to follow the piston at a higher temperature and pressure, all of which means power. A one-piece camshaft with eight cams is used. Another new point is that the exhaust manifold and piping have been enlarged with the idea of freeing the engine of back pressure and increasing the power. The clutch is a multiple-disk design and the three-speed selective gearset has its shafts mounted on Timken roller bearings. The gearset is housed in a one-piece aluminum casting which has the supporting arms or spiders cast integral with it. The motor, clutch and gearbox are a unit and the propeller-shaft is of a double universal and slipjoint construction. Nickel steel shafts mounted on adjustable Timken bearings are found in the rear axle, and the driving bevels also are of nickel steel. The bevel gear differential, which is housed in two steel castings, has four pinions and the adjustment of the bevel gears themselves has been improved and simplified. A pressed steel axle housing is used. Coming to the front axle one finds that it is a forging, the center or axle proper being a one-piece forging of I-beam type and fitted in its jaws are forged knuckles, the knuckle bolt of which is unusually large, hardened and ground. The knuckles are fitted with two hardened and ground bushings, the upper one being flanged, and acting as a thrust collar against a similar bushing fitted in the axle proper. Adjustable steering connections permit of the slack being taken

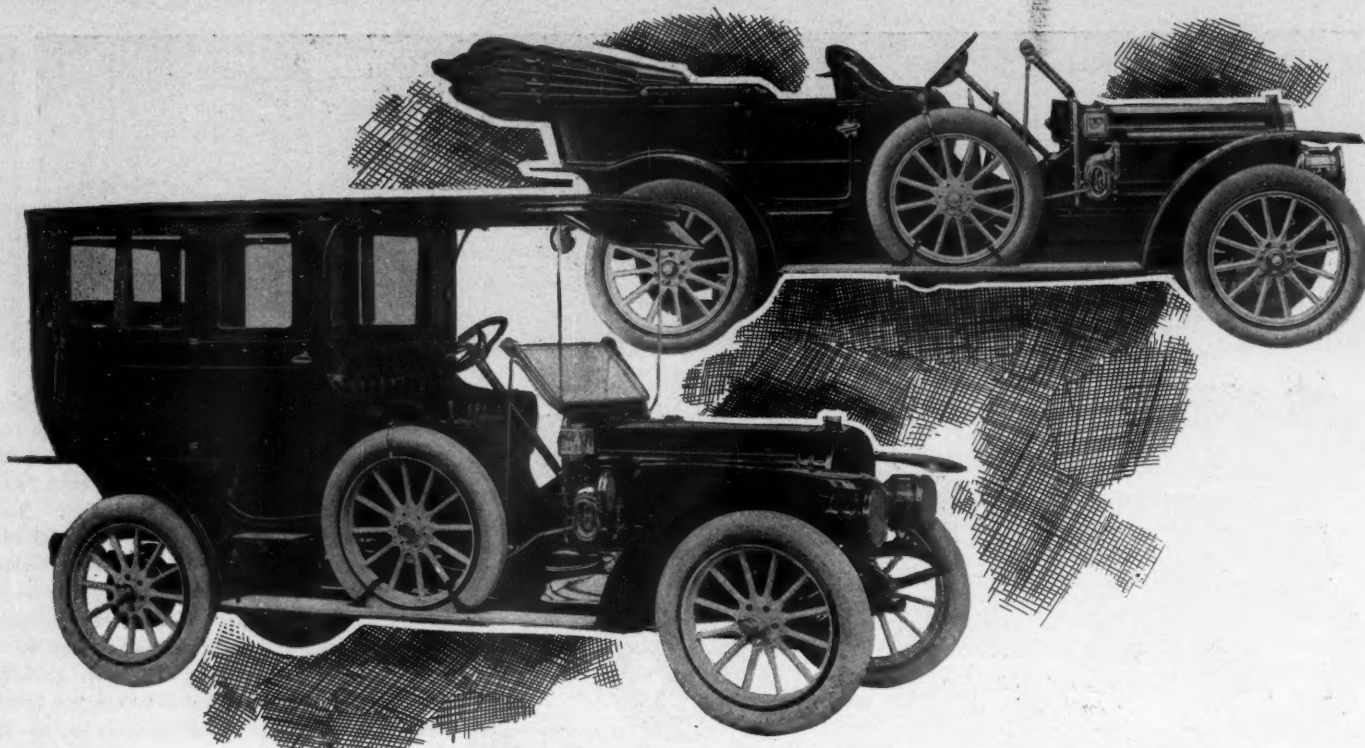
up; the steering gear being of the right-and-left thread type and having a pair of followers which act against a T-headed crank by which adjustments are made. There is a choice of ignition systems, an Atwater Kent and the Bosch dual. The wheelbase of the car measures 110 inches.

The company also uses a seven-feed McCord oiler which is placed parallel with the engine cylinders, there being a feed to each of the cylinders, one to each end bearing and one to the gearbox. The emergency brakes are of the internal expanding type and fitted to the rear wheel brake drums. The service brake is a contracting band fitted to the transmission brake pulley and all brakes are lined with asbestos. A feature of the touring body is the ample room found between the front and rear seats, the rear cushion being 48 inches in width. This lengthening of the space between the seats has enabled the company to give 2 inches more wheelbase. The new car, the close-coupled type, is designed for four passengers and it is aimed to give plenty of luggage space in the rear of the tonneau.

**Rambler**—Thomas B. Jeffery & Co. did not participate in either of the New York shows, contenting themselves with displaying



DORRIS TOURING CAR WITH A ROOMY TONNEAU  
DORRIS CLOSE-COUPLED CAR, ADDITION TO LINE



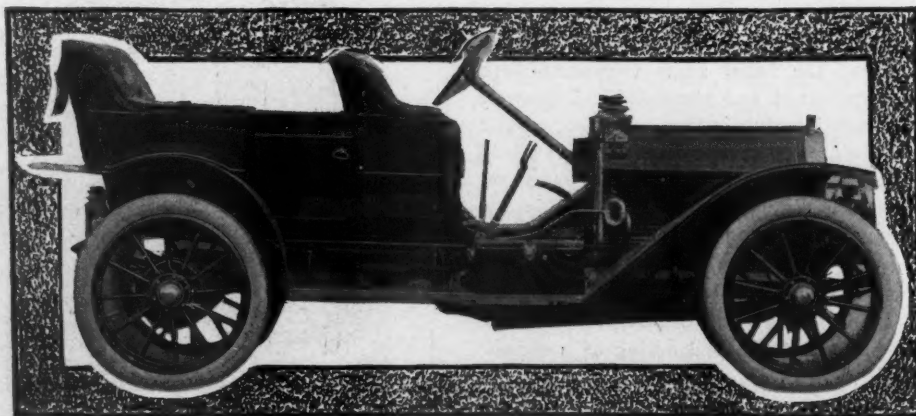
TWO OF THE NEW RAMBLERS, THE TOURING CAR AND THE COMFORTABLE-LOOKING LIMOUSINE

their goods at a private exhibition in its New York headquarters. Therefore, the Coliseum is the first public show in which the Rambler has been seen this year. No new models are found in the line, models 54 and 55 being a continuation of the 1909 45 and the third Rambler chassis is a continuation of model 44. The two chassis first mentioned carry 45-horsepower engines with the cylinders 5 by 5½ inches, and the third one is of 34 horsepower, the cylinders being 4½ inches square. Principal of the changes of 1910 has been the removing of the pump which has been put forward into the camgear case in order to locate the magneto where the pump formerly was, the idea being to secure a cleaner and more accessible place for the magneto. In place of a single-belt drive a mechanical oiler is provided with a double one. Also a neat idea is a switch of Rambler design in the double ignition system, which permits of the use of either system entirely independent of the other through a single set of plugs. Each system is independent and complete, for if the magneto were removed the car can be operated on the battery or vice versa. In place of the cone clutch used on Ramblers in previous years, there now is fitted one of the internal expanding type of particularly interesting design. Then, too, the Rambler designer has made a change in the transmission in that the large roller bearing in the main driveshaft is hinged and doweled, providing means to counteract end thrust. As formerly, the rear axle driveshafts are still integral with the pinion on the inner end, the pinion being upset thereon in a bolt-heading machine; but now the wheel end also is enlarged and the enlarged part is machined to a tapered square. By means of a press with

a capacity of 1,000,000 pounds pressure, a tapered square punch forces an opening in the forged hub to an exact fit of the axle end, which, it is claimed, gives a construction 25 per cent stronger than when previously made with a key. The roller bearings at the wheel end of the rear axle are larger. Noticed in the steering is that while the screw-and-nut type is continued, the nut has been lengthened to increase the surface exposed to wear and a ball thrust bearing counteracts the downward pressure of the shaft. An impression of greater radiator depth is secured by supporting the radiator by means of an aluminum girder. Spring clamps now hold the bonnet, the strap method having been done away with. A pressed steel bracket supporting the bonnet at the dash is a new idea and the dash itself has square corners which permit of the attachment of the Rambler glass front without other fittings. To prevent accidental dislodging of the operating lever when it is in neutral, this lever now is brought to a central point where it is held by means of springs. The

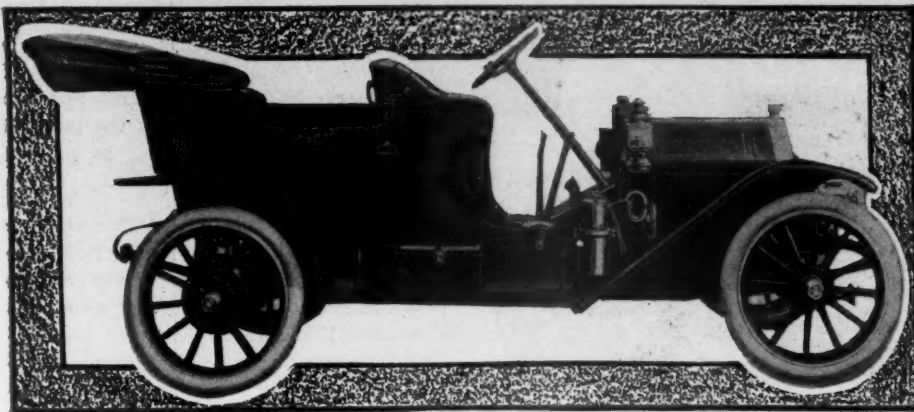
guard fillers now extend to the top of the frame, covering the step hangers. The guards are convex. The rear springs are somewhat straighter and the second leaf is longer, extending into the bend to better support the main leaf. The body is considerably lower, and the driver is given more room between the seat and pedals by placing the body farther back on the frame. A magneto and a gas tank now are included in the equipment. The 34-horsepower Rambler has the same changes in the engine, transmission and rear axle, and the wheelbase has been shortened from 112 to 109 inches that the car may be more easily handled. In order, however, to make up for a possible loss in easy riding qualities elliptic rear springs now are fitted instead of the semi-elliptic type. On all three models are found such Rambler features as the offset crankshaft, straight-line drive and 36-inch wheels.

**Richmond**—Under the name of Richmond the Wayne Works makes a variety of models, some of which are air-cooled, and others water-cooled, the latter being



AUBURN MODEL X, ONE OF THE FOUR-CYLINDER BRIGADE





GREAT WESTERN 30, READY FOR THE TOURIST

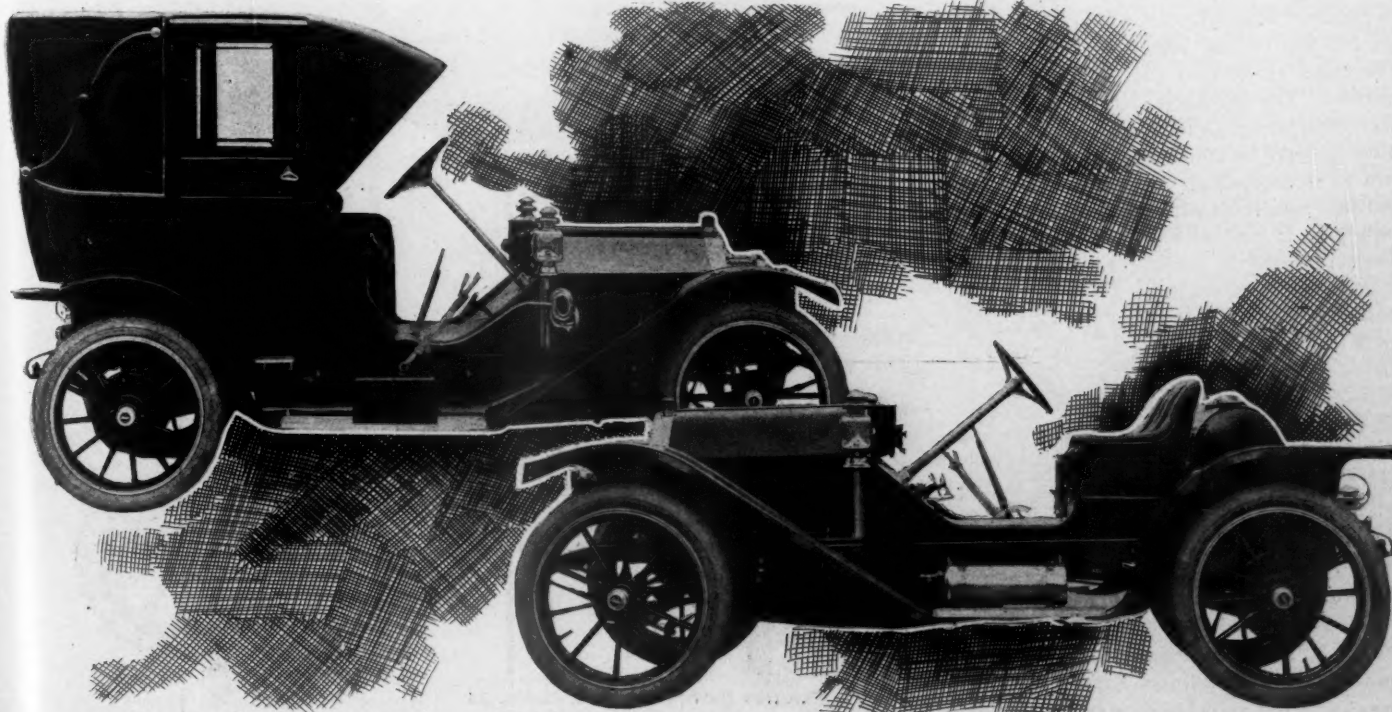
shown for the first time. There are two chassis in the air-cooled type, the J-1 being a four-cylinder motor with  $3\frac{3}{4}$ -inch bore and 4-inch stroke which gives 22.5 horsepower, and the other has 26-30 horsepower with a 4-inch square cylinder, the cylinder being cast individually. On J-1 the wheelbase is 100 inches, and J-3 106 inches, both carrying 30-inch wheels. The ignition is by high-tension magneto and dry cells, and the lubrication is effected by a circulating pump in the engine base. The transmission gives two forward speeds and is of the progressive type. The clutch is of the cone type. In the water-cooled line, there also are two chassis, the roadster type with 100-inch wheelbase and the touring car 106-inch. It has a 4 by 4-inch motor, rated at 26-30 horsepower and the cylinders are cast individually. The cooling is by thermo-syphon and as is the case with air-coolers the ignition system comprises a high-tension magneto and dry cells. In other details the two types are about the same. There also is a great similarity in the two motors outside of the

cooling systems and size of cylinders. The intake and exhaust pipes are on the same side, and the intake and exhaust valves are of the mechanical type. The pistons have four rings and the connecting rods are made of bronze with babbitt bearings. There are five separate bearings for the crankshaft. The self-contained lubrication system consists of an oil well which is located in the extreme lower part of the engine base, and a gear pump driven by the camshaft which pumps the oil from this well through a single-sight feed glass located on the dash to the four separate compartments in the crankcase where the oil is splashed by the connecting rods onto the cylinder walls and the bearings. The surplus overflows back into the well.

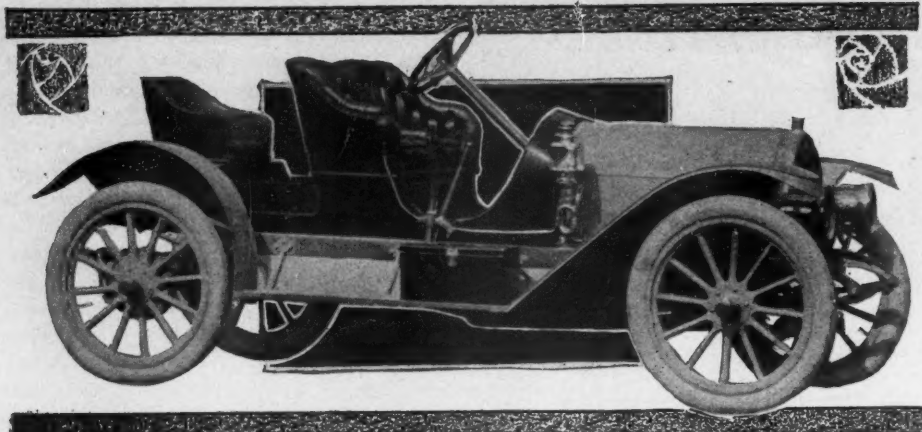
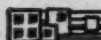
**Lexington**—Jumping into the limelight as the result of its fine showing in the last Glidden tour, the Lexington offers two chassis for 1910. In the higher-priced model there is a variety of body types offered, one of them being a limousine, another a touring car, a third a close-coupled car and a fourth a demi tonneau.

The lower-priced model is made only as a touring car. The motor on the big model is a four-cylinder, rated at 40-45 horsepower and with a bore of  $4\frac{1}{4}$  inches and a stroke of 5 inches. Splash lubrication is employed and a gear-driven pump is part of the scheme. The transmission is particularly strong, it being claimed that it is the same that would be used in the 60-horsepower car. It has three speeds forward of the selective type and Hess-Bright bearings are utilized. A leather-faced cone clutch also runs between Hess-Brights. The front axle is an I-beam and carries Timken bearings and the rear axle is of the floating type. The motor and transmission are mounted on a subframe and the frame itself is made of cold rolled pressed steel. The wheelbase is 122 inches and the wheels carry 36 by 4-inch tires. The lower-priced chassis has a motor of smaller horsepower. The stroke is the same, 5 inches, but the bore is  $\frac{1}{4}$  inch smaller, the rating being 35-40 horsepower. The wheelbase is 116 $\frac{1}{2}$  inches instead of 122, and the wheels are also smaller, carrying 34 by 3 $\frac{1}{2}$ -inch tires, and running on Hyatt bearings whereas Timkens are used in the big car. Also, there is a difference in the springs, ellipses being used in the rear but semi-ellipses being fitted in the front the same as on the other model. The lubrication, transmission and clutch are the same, but the brakes are smaller, being 12 by 2 inches, two on each rear wheel, whereas on the larger model they are 2 inches larger.

**Great Western**—The Great Western comes before the public in only one form this year, a chassis with a  $4\frac{1}{4}$  by 5-inch motor which has a rating of 28.9 horsepower, the motor being somewhat larger than last year in cylinder dimensions. Not alone has there been a change in the motor



MARION LANDAULET AND MARION TWO-PASSENGER ROADSTER



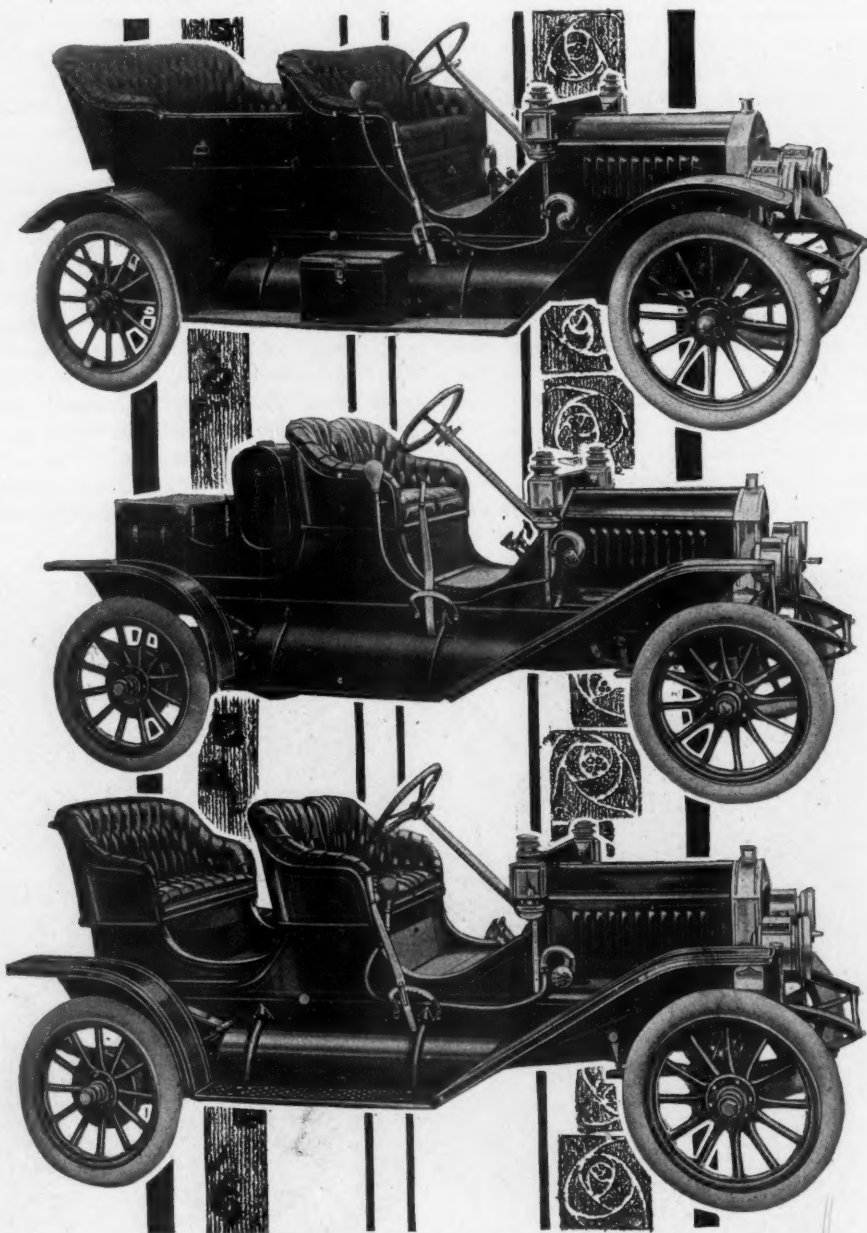
AUBURN ROADSTER WITH SINGLE RUMBLE SEAT

but now the carbureter and magneto are placed on opposite sides and the half-time gears are entirely inclosed. The oil reservoir is located in the bottom of the crankcase, a constant oil level being maintained, the lubricant being splashed to the cylinders and working parts. A force-feed pump puts the oil into the compartments for the connecting rods, and as the oil reaches a certain level it flows back into the oil reservoir. Crankcase compression is relieved by an improved vent pipe which will not allow the oil to escape. Other new features are a drop frame and 34-inch wheels. The body design shows the adoption of a U-shaped door with a solid hinge and a safety hood lock. The cooling system shows improved water piping and there have been some changes made in the transmission, the gears of which are now made in the company's own factory. Raybestos lining is used in the cone clutch and there are springs underneath to insure easy engagement. Featured in the motor whose four-cylinders are cast separately are long waterjackets of considerable capacity. The cylinder walls are ground to the top of the head, the heads being machined to prevent the accumulation of carbon. The intake manifold is of peculiar construction, and the spark plugs and timing cocks in the intake valve chambers are most accessible. By constructing the exhaust manifolds with no sharp bends and enlarging it gradually toward the rear end, back pressure is reduced to a minimum. The exhaust valves in the center of the cylinder heads are operated through push rods and rocker arms and are contained in cages. The intake valves are located in outboard chambers which are characteristic of the L-type motor, the valves operating by means of lifters below. The push rods are adjustable and are removed by taking off four yokes which clamp them down to the crankcase. The connecting rods are of drop forged steel of I-beam section and the crankshaft is a forging with the fly-wheel bolted to it by means of a flange which is forged integral with it. The crankcase is of aluminum alloy. Working stresses of the cylinders are taken care of by steel studs holding the cylinders and

supporting the crankshaft bearings and caps as well, so that the stresses do not fall upon the crankcase. The drive to the rear axle is shaft, the shaft being inclosed in a tubular housing which serves as a torsion

tube. The front axle is a one-piece nickel steel forging and the rear one is of the semi-floating type. The artillery type of wheels carry 34 by 3½-inch tires, and two separate sets of brakes are of the internal and external type, both acting on pressed steel drums and the rear wheels.

**Auburn**—Three models of four-cylinder cars and a pair of twins form the line made for 1910 by the Auburn. One of the pioneers in the manufacture of two-cylinder cars, the Auburn company has followed this up by passing into the four-cylinder field, with a four-cylinder four-cycle water-cooled engine with the cylinders cast individually and with integral waterjackets brought out for the first time a year ago. On the left side of the engine are the exhaust and intake manifolds and the carbureter, and the magneto is on the right. The three-speed selective gearset and the clutch are a unit and the differential is of the bevel gear type. There



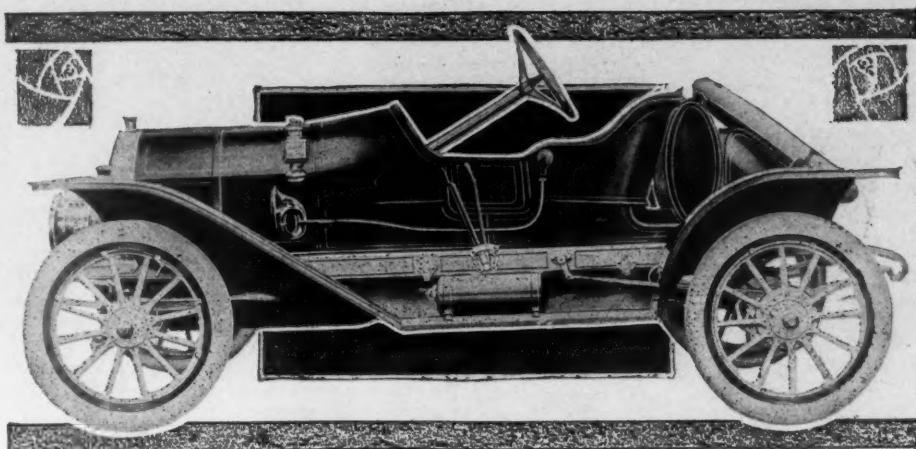
FRICTION-DRIVEN LAMBERT, MODEL 36

TWO-PASSENGER LAMBERT ROADSTER, MODEL 17

FOUR-PASSENGER LAMBERT ROADSTER, MODEL 21



is a live rear axle and the brakes are featured by large drums on the rear wheels. Of the three four-cylinder models the company is particularly proud of model X, which is a 35-40-horsepower touring car with an engine with a bore of  $4\frac{1}{2}$  and a stroke of 5 inches. In this the designer has catered to public desire by giving a longer wheelbase, larger wheels and a roomier tonneau. Lubrication is effected by a self-contained oiling system in the base of the motor, a gear pump pumping the oil separately to the four compartments of the crankcase, there being drain cocks at the bottom of the case. Transmission bearings are oiled by splash and are of the Hess-Bright type and the large gears run in a bath of oil. An aluminum housing which is integral with the transmissioncase carries a multiple-disk clutch, the clutch consisting of a series of disks made of circular saw steel blanks, every other disk being a driver, the alternate one being driven, while power is delivered



COLE'S IDEA OF THE TORPEDO BODY STYLE

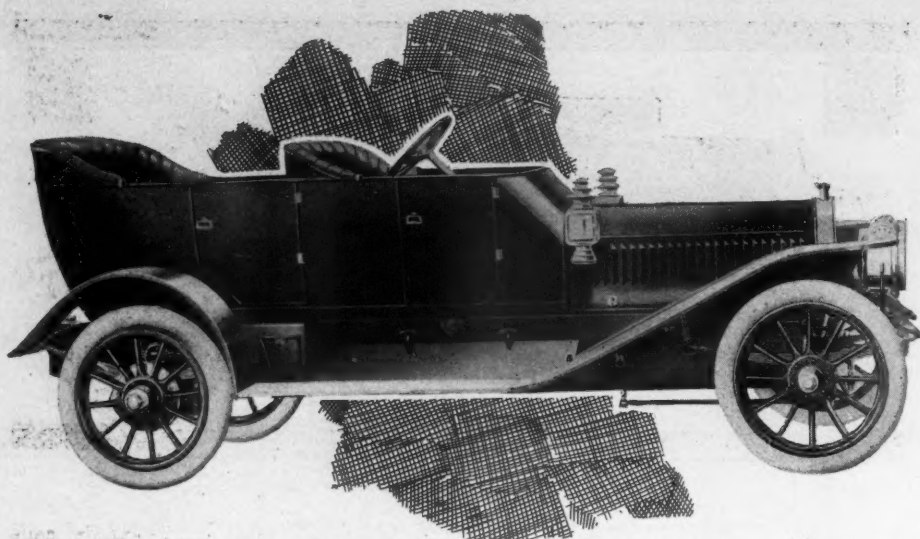
from the driven disks by a spider with six driving arms. The six springs which start the disks into action can be adjusted through a hand hole beneath the inspection plate. The Remy magneto, with its

single-unit, non-vibrating coil and dry cells forms the ignition system. Shaft-drive is employed, there being a double universal joint ahead and a single universal joint in the rear of the transmission gear. Semi-elliptic springs are fitted in front and elliptics in the rear. The wheelbase on the X is 116 inches and the tire size is 36 by  $3\frac{1}{2}$ . The model R is fitted to the same chassis but comes as a four-cylinder baby tonneau. Model S also is a 35-40-horsepower car but is a roadster with either a single or double rumble. The model B is a 25-30-horsepower touring car with the same characteristics as the other except that the motor has 4 by 4-inch cylinders, 106-inch wheelbase and 32-inch wheels. The Auburn people have been making the two-cylinder car since 1902 and have developed it to such an extent that the two models in this line have been continued from 1909 without change as a five-passenger touring car and as a roadster. In the two-cylinder motor, which is of the double-opposed type, the bore exceeds the stroke, the dimensions of the cylinder being  $5\frac{1}{4}$  by 5 inches. This engine is placed under the seat and is so accessible that all working parts of it may be reached without removing the body. All gears are inside the case and run in oil. The transmission is planetary, and the clutch of the friction-balanced type. Chain-drive is utilized, and the ignition scheme consists of a storage battery or dry cells and a double vibrator coil carried on the dash. The carburetor is one of the company's own make and the radiator is of improved construction, ample water circulation being secured by means of 143 feet of coil, and a gear pump in the bottom of the crankcase circulates the water. On top of the crankcase is a belt-driven, six-feed oiler which oils to each principal bearing. The front axle is tubular and the rear is of a live type, carried on Hyatt roller bearings. The wheelbase is 100 inches, and the wheels 32 by  $3\frac{1}{2}$ . There are two Raymond brakes of the external contracting band type on the rear hubs.

**Springfield**—One of the newcomers in the medium-priced class is the Springfield, made in Illinois, which offers the choice of



FRANKLIN CAR FOR USE OF FIRE CHIEF  
SPECIAL FRANKLIN RUNABOUT WITH SIDE DOORS



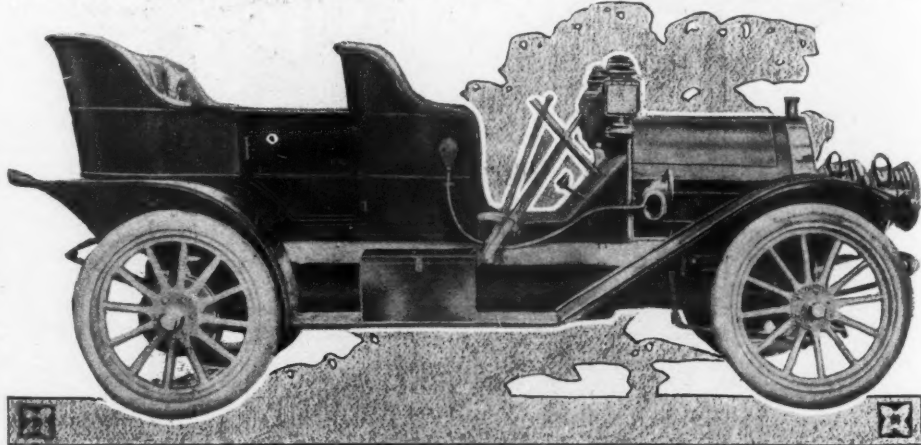
WINTON SIX TOURING CAR WITH TORPEDO BODY

two bodies, one of them of the touring type and the other a torpedo. The motor it carries is a 50-horsepower four-cylinder of the L type and with the cylinders cast in pairs. The bore is 5 inches and the stroke  $4\frac{3}{4}$ , this being one of the few examples where the bore exceeds the stroke. The valves are all on one side, and are operated by a single camshaft with the cams integral with the shafts. Chrome vanadium steel enters into the construction of the camshaft, crankshaft and camshaft gears, while the camshaft, idler gear, pump and magneto are mounted on F. & S. annular ball bearings. The offset crankshaft also is made of chrome vanadium steel, while the waterjackets of the motor are cast integral with the cylinders. There is a positive automatic oiling system in which the lubricant is carried from the lower half of the crankcase to the bearings and cylinder walls, the system being entirely inclosed in the crankcase and a gear pump supplying the circulation. This pump is positive gear-driven from the camshaft, the exhaust being carried through a copper manifold direct to the main and camshaft bearings. The overflow from the main bearing flows into a recess in the bearing caps and is carried through a hole in the crankshaft downward through the hollow crankshafts to the connecting rod bearings. Centrifugal force drives the oil through this course. Surplus oil from the moving parts is carried upward into the wristpin bearings and cylinder walls. The flywheel is bolted on a flange integral with the crankshaft. There is a double universal joint between the cone clutch and the transmission, the clutch being held in engagement by three coil springs evenly spaced near the rim of the clutch, designed to eliminate torsional stresses on the clutch spider. Adjustment of these springs is provided to increase the spring tension by screwing up three nuts. In the transmission, which is of the selective sliding type, giving three speeds forward, possibilities of keys working loose are avoided by having the three large keys on the sliding shaft made integral with the shaft. The control sleeves enter the

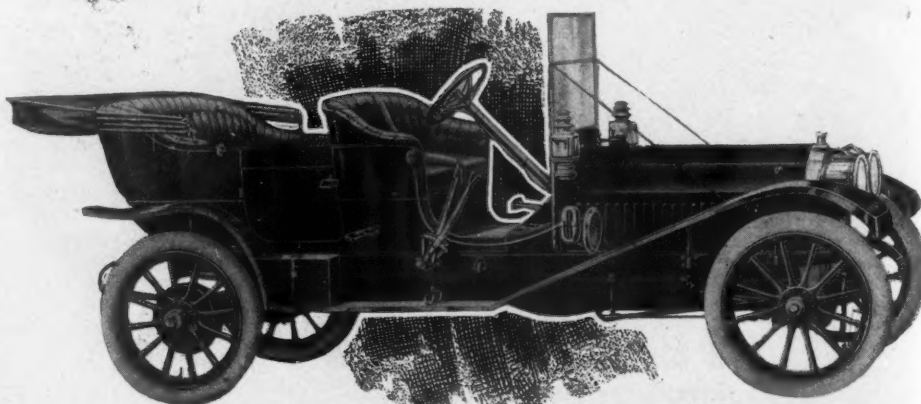
transmission case, which is of aluminum, directly from the control levers. Water circulation is by a rotary pump while a honeycomb radiator is fitted. The steering gear is of the rack-and-pinion type with ball thrust bearings, and with the steering knuckle drop forged in one piece of chrome vanadium steel. The rear axle is of the floating type and made of one-piece seamless steel. The front axle is an I-beam forging with the steering rod back of the axle. Semi-elliptic vanadium steel springs are used in front, and three-quarter elliptics in the rear. A double system of magneto-storage battery ignition is used, there being two spark plugs in each cylinder. The wheelbase is 128 inches and

the tires 36 by 4 in front and 36 by 5 in the rear, making comfortable riding.

**Rider-Lewis**—Neither the four nor the six-cylinder Rider-Lewis is new on the market, but this year the company is devoting more of its attention to the former than it did in 1909. The result of this has been the production of a 30-horsepower motor with 4-inch bore and  $4\frac{1}{2}$ -inch stroke, the cylinders being cast en bloc, and employing the thermo-syphon system of cooling. Another feature of the Rider-Lewis is its oiling system, for which patents are pending. It is a self-contained system, the crankcase pan being provided with two basins into which the oil is thrown by the action of the centrifugal vane on the crankshaft, while from these basins above the crankcase level large gutters convey the oil to each connecting rod trough, where it is picked up. As a provision against excessive oiling each trough is supplied with an outlet at the proper height which passes the oil back to the circulation pool. Another feature here is that the crankcase pan drops on the removal of eight bolts, which gives access to the connecting rod. The motor has flexible supports made of pressed steel, which give it a two-point suspension. The rear axle and gearset are integral, and there is a straight-line drive back from the motor, the drive being inclosed in a tubular casing. The front axle is a non-welded I-beam forging, while semi-elliptic springs are used on front and elliptics in the rear. The wheels carry 32 by  $3\frac{1}{2}$ -inch tires, and the wheelbase is 102 inches. The clutch is a cone with cork in-

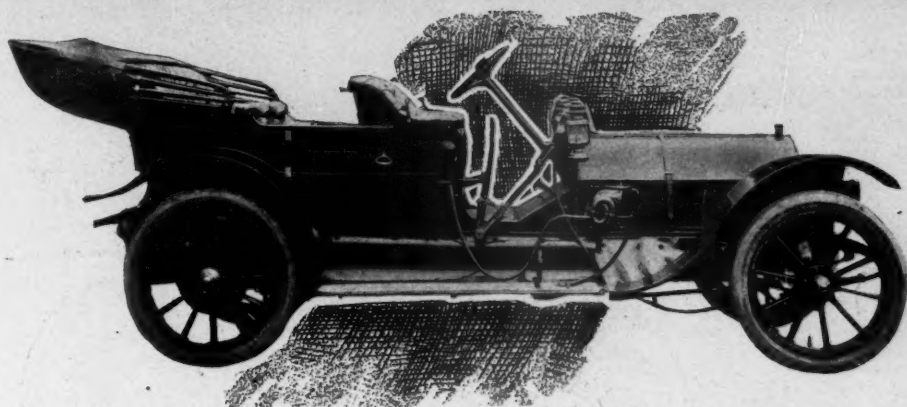


FOUR-CYLINDER TYPE OF RIDER-LEWIS

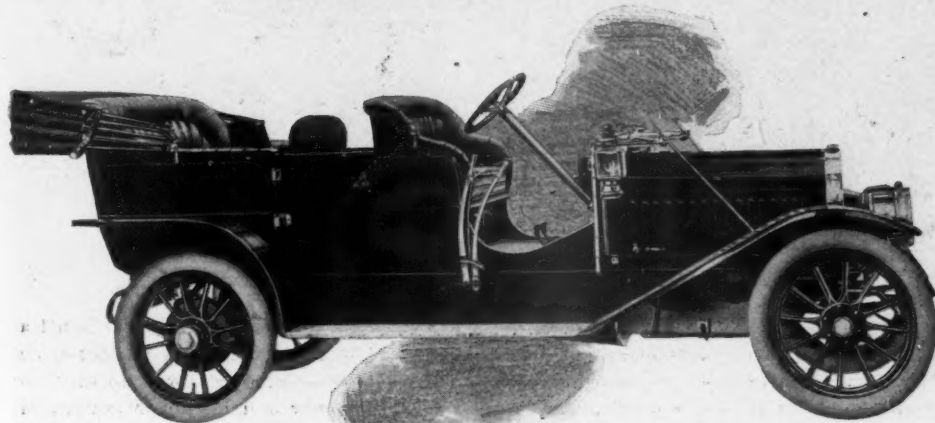


R. A. C., A FIVE-PASSENGER, SIX-CYLINDER PROPOSITION





MATHESON IN ITS SIX-CYLINDER FORM



AUSTIN SIX-CYLINDER TOURING CAR IN 1910 DRESS

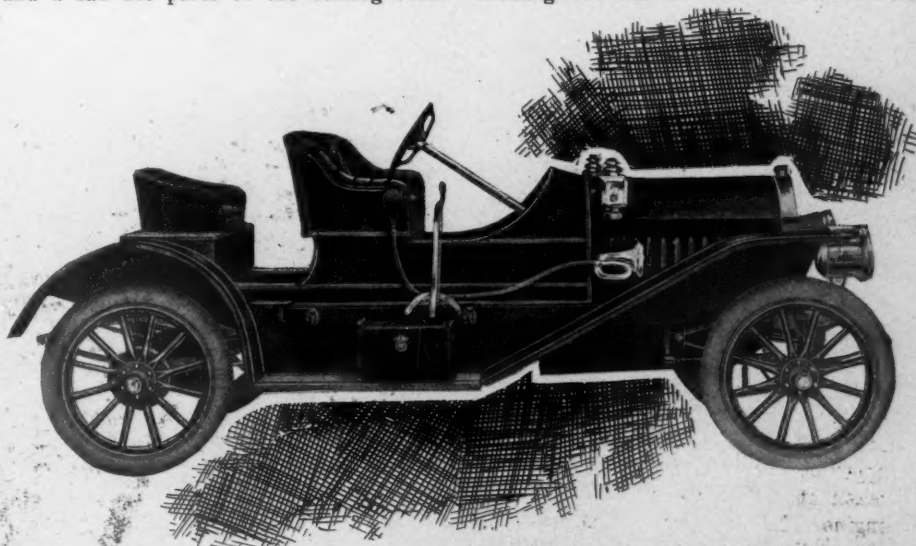
serts, and there is high-tension magneto ignition. In the six, the cylinders are individually cast with an overhead camshaft and inclosed valve action. Like the four, the valves are in the head. The water pump and a fan bring about the cooling, while the lubrication scheme employed consists of a shaft-driven positive pump with the splash level maintained by a force-feed lubricator. The crankcase is a one-piece casing in which the crankshaft is assembled endwise, the front and rear caps closing in the crankshaft, while hand hole plates give access to the connecting rods and crankshaft bearings. The forward universal joint is coupled directly to the clutch sleeve. The three-speed gearset and the rear axle are a unit, the housing being of aluminum while the gears are chrome nickel steel mounted on chrome nickel steel shafts running on roller bearings. The pressed steel chassis is of the bottle-neck type with a drop frame construction in the rear, while semi-elliptic springs are used in front and three-quarter elliptics in the rear. There is magneto ignition and the horsepower rating is 40-45. The wheelbase is 122 inches, and the tires 34 by 4 inches. There are four brakes, two internal expanding on the rear hub, and two Raymond double-acting hand brakes operating on the rear hub drums.

**R. A. C.**—The R. A. C., made by the Ricketts Auto Works, is a six-cylinder proposition, the motor being 50 horsepower with removable cylinder heads and with the valves in the heads. The bore is 4 1/8

inches and the stroke 4 1/4 inches. The transmission gives three speeds with selective control and the gears are made of chrome nickel steel and mounted on double ball bearings. The clutch is a cone fitted with cork inserts. The oiling system is of the circulation type, the crankcase being cast with a double base and carrying 4 gallons of oil in a reserve chamber. A high-tension Bosch magneto and batteries constitute two separate systems offered for ignition purposes; and the cooling is by the pump system in which the copper pipes used are 1 1/2 inch in diameter. In connection with this a honeycomb radiator and a fan are parts of the cooling idea.

The rear axle is made of one-piece pressed steel, and is of the floating type and fitted with Timken bearings. The I-beam front axle is of the Mercedes type. Worm-and-sector steering is employed. There are double brakes on the rear wheels, two internal expanding, and two internal contracting, the drums being 16 inches in diameter. The brakes are lined with thermoid and are adjustable. The wheelbase varies, being 142 inches for the seven-passenger car and 133 for the toy-tonneau and roadster, and the same size wheels, 36 inches, are used in all models. The seven-passenger car carries 4 1/2-inch tires and the other 4-inch. Considerable attention has been given to the spring suspension of the R. A. C. and in front have been fitted semi-elliptics 39 inches in length, whereas in the rear are elliptics of the scroll pattern 49 inches in length. These springs are 2 inches in width.

**Fuller**—Satisfied up to this year to make two-cylinder solid-tired cars, the Fuller company now has branched out, and is making two and four-cylinder cars with touring car and roadster bodies and using pneumatic tires. Models A and B hang over from 1909, but several changes have been made in them, one of which is the enlargement of the two-cylinder motor from 5 by 4 to 5 1/4 by 4 inches. A sight-feed adjustable oiler has been placed in the top of the crankcase, the wheelbase has been lengthened from 96 to 100 inches, the magneto has been added, the steering is an improved type with the spark and throttle levers on top of the steering wheel instead of underneath, and instead of internal wire solid tires, clincher solid tires of the Swinehart type are used. The four-cylinder car has a motor whose cylinders are cast en bloc, and which are square, developing 25-30 horsepower. Circulating is by thermo-syphon, and the lubrication is effected by means of a circulating oil system which is operated by a pump located in the crankcase. The transmission is planetary and shaft-drive is used. Dry cells furnish the ignition, and the braking consists of external hub brakes



FULLER AS A THREE-PASSENGER RUNABOUT



MONITOR DELIVERY WAGON IN ENCLOSED AND FLARE-BOARD OPEN BODY STYLES

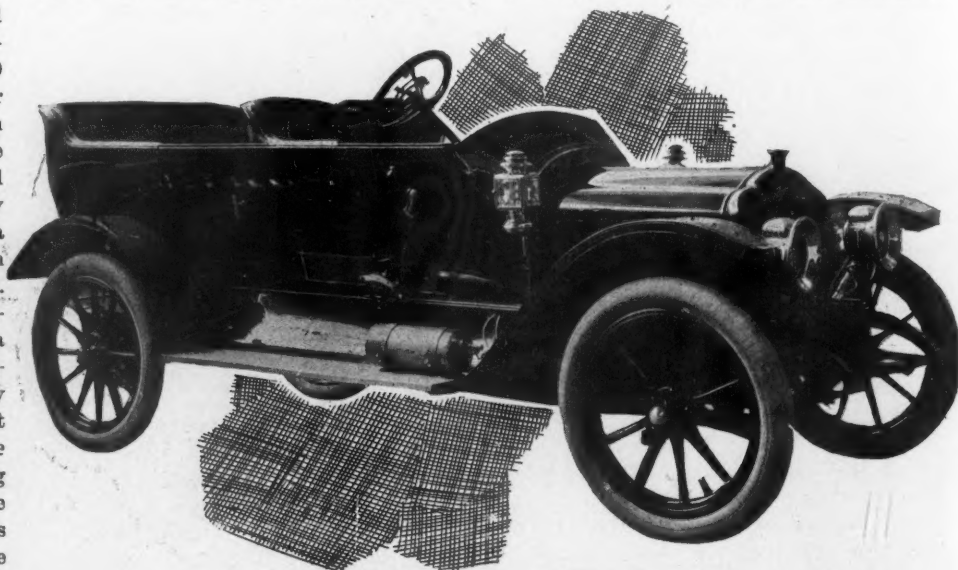
on the rear wheels operated by a pedal, whereas the expanding internal hub brake is manipulated by means of a lever. Elliptic springs are used front and rear, the frame is pressed steel, the wheelbase 100 inches, and the wheels 32 inches. Also in the pneumatic tire line are two models, one a touring car and the other a runabout, which carry a two-cylinder opposed motor which is placed horizontally under the hood and which develops 22 horsepower. This same chassis also is used in the solid-tire division, which includes a runabout, a commercial car with a detachable body which may also be used for a passenger vehicle; a delivery wagon of 800 pounds capacity and an inclosed delivery vehicle with heavy duck sides and double doors in the rear.

**Monitor**—Catering to the commercial end of the business, the Monitor is offered in two chassis, one of them of 1,000 pounds capacity and known as type B, and the other of 2,000 pounds capacity and styled type A. Among the changes is the lengthening of the wheelbase from 86 to 100 inches on both chassis, and a heavier frame, made of pressed steel, is used on both. The oiling system is built into the motor and the gearset has been changed so that the driver controls the car by means of a pedal while it is running on a low speed, which enables him to use both hands in steering and using the throttle. The Monitor motor is a two-cylinder horizontal opposed water-cooled type, with a 5-inch bore and a 4-inch stroke. It is possible to remove the cylinders separately and the crankcase is so constructed that the removal of four bolts permits of the upper part, together with the oiler, being taken off and exposing the parts of the engine. The cast steel connecting rods are of the hinge type, giving adjustable wristpin bearings. The valves are mechan-

ically operated. Collars hold the push rod springs in position so that no key or pin is required. Shaft-drive is used on both chassis, and the gearset is planetary. There is a cellular radiator and the ignition is by means of a storage battery and coil. The wheels are 32 inches and carry 2¼-inch solid clincher tires both front and rear. A variety of bodies is offered, one of which is an express body 113 inches in length, 43 inches wide, 78 inches from the back of the driver's seat to the tail gate, side panels 12 inches high and flare boards 8½ inches wide. Besides the express body there is an inclosed body type 113 inches in length, 43 inches wide and 62 inches high with oil canvas sides and top, the canvas being stretched over a wood frame. These two bodies are designed for delivery use and are intended for dry goods merchants, groceries, butchers, laundries, milk dealers and the like. The Monitor emergency car is termed a trouble wagon and

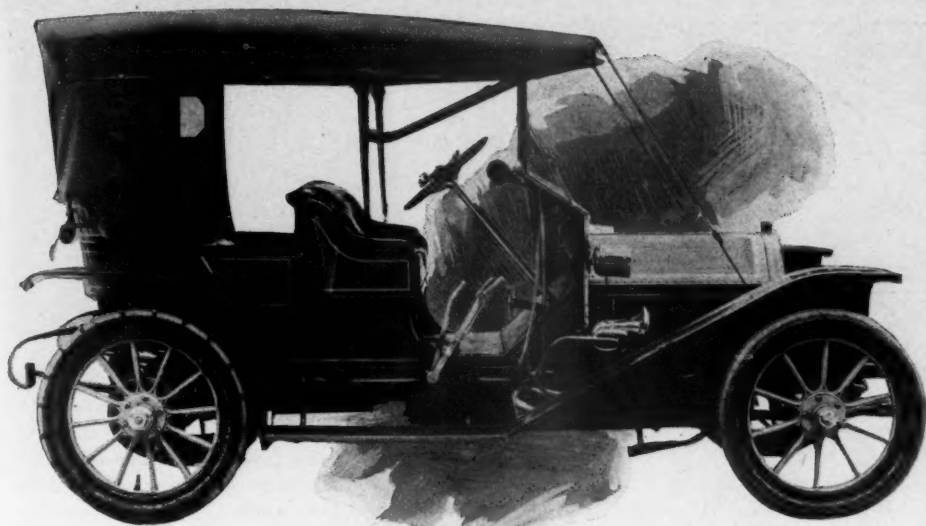
has the type D chassis on which is fitted a body 113 inches long and 35 inches wide and which is designed for the use of electric light, power and telephone companies which have to send men out on quick repair trips. Another inclosed body which is fitted to the type A chassis is of the inclosed type, and with a length of body of 110 inches and a width of 43 inches. Still another inclosed body on this chassis is made of finely-paneled wood and with French beveled plate windows, the length of the body being 108 inches, the width 42 inches and the height 62 inches. These cars are all equipped with leather seat cushions and upholstered lazy backs.

**Clark**—One of the new commercial propositions at the show is a Chicago product, the Clark, which is of 1,500 pounds capacity and which offers several types of bodies adapted to light delivery work. One of these is a combination body on which the top is removable, so two extra seats



WHITE GASOLINE CAR FITTED WITH TORPEDO BODY





DIAMOND T AS FOUR-PASSENGER ROADSTER

can be carried and the machine used as a depot car. The Clark derives its motor power from a new four-cylinder motor with the cylinders cast en bloc, with thermo-syphon cooling and with the inlet manifold cast integral with the cylinders. The valve springs are covered with an easily removable plate. The bore is  $3\frac{3}{4}$ -inch and the stroke 5 inches. Provision is made for mounting a magneto, and the fan and starting crank are carried on the front gearcase. The oiling system is self-contained. The clutch is of the multiple-disk type inclosed in the flywheel, and there being a bevel universal joint between the clutch and the transmission, the latter giving three speeds forward and being of the selective sliding type. The floating rear axle is carried on large New Departure ball bearings, while the propellorshaft is incased in a torsion tube. There is an irreversible steering gear, with the throttle and spark above the wheel. Two independent sets of brakes operate on the rear wheels. The frame is of pressed steel throughout with forged spring hangers, there being semi-elliptic springs in front, 42 by 2 inches, and 36 by 2-inch elliptics

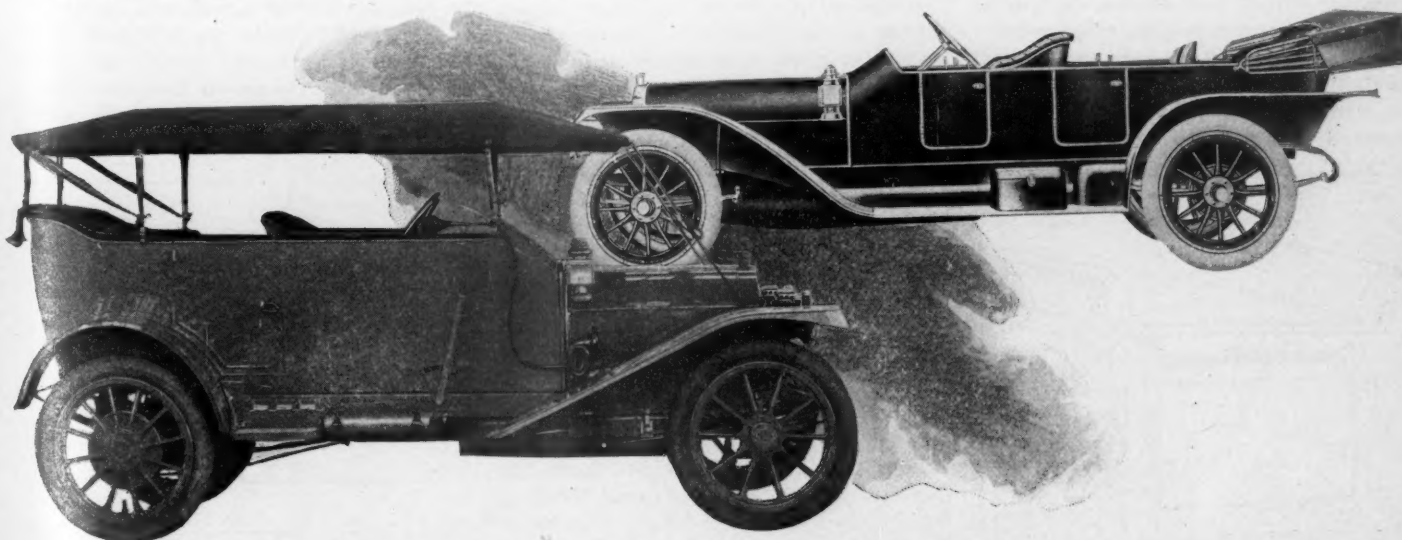
in the rear. The weight of the car is given at 2,400 pounds. It has a wheelbase of 96 inches, the tread is  $56\frac{1}{2}$ , and on the front wheels are 34 by 2-inch solid tires, and 36 by  $2\frac{1}{2}$  solids on the rear.

**Diamond T**—Besides the 50-horsepower chassis, which was the only Diamond T put out up to the middle of last summer, the Tilt company is showing a smaller running mate in a 30-horsepower car which is identical almost with the big one except a few minor details, and of course in size. There have been a number of changes made in the big car, chief of which is a new type of motor in which both the intake and the exhaust are placed on the left side instead of the right. Another improvement in connection with this is the use of spiral timing gears with the idea of securing quietness of running. Designer Tilt also has made a change in his ignition system and instead of the magnetic plug which he used before he is fitting the Bosch dual type. The steering gear is placed at the top of the frame so that now all the steering devices are above the front axle and the steering reach is straight. In the lubrication scheme he has run an oiling pipe through a glass on the dash in order that

the driver may satisfy himself at any time as to whether or not the oil is circulating. The cooling is secured by means of a centrifugal pump and the clutch is a multiple-disk with fifty-two plates, running in oil. Then, too, there is a double universal between the clutch and the transmission and there also has been an improvement in the system whereby throwing out the clutch is made easier. The transmission is of the selective three-speed type. The rear axle is of the floating type with a pressed steel housing and an inspection plate at the rear so the differential can be easily removed through it. Another change is the switch from semi-elliptic springs to three-quarter-elliptics all around. Timken short-series bearings are used in both axles, the only ball bearings being the Hess-Brights in the transmission. A slight point of difference between this and the larger model is found in the motor which continues the placing of the exhaust and intake on the right side such as was in vogue in the big car last year. The motor is  $4\frac{1}{4}$  by  $4\frac{1}{2}$ , and it is rated at 30 horsepower. The wheelbase is 108 inches, and the tires are 34 by 4 inches.

**Zimmerman**—Originally a motor buggy concern, the Zimmerman company comes out for 1910 with a four-cylinder low-wheeled pleasure car of medium price, the motor being of 35 horsepower and being conventional throughout. The magneto and batteries furnish the ignition, there is a selective sliding gearset and the lubrication scheme involves a base oiler and a positive gear pump. The frame is of pressed steel, upswept over the rear axle, which is of the semi-floating type, the front axle being I-beam. The wheelbase is 115 inches and the tires carried are 34 by  $3\frac{1}{2}$ .

**Austin**—The Austin six-cylinder is one of the veterans, and the offerings for 1910 is a 45-60 horsepower five-passenger touring car, the cylinders having a bore of  $4\frac{3}{8}$  inches and a stroke of  $5\frac{1}{4}$ . It is fitted with double ignition and the gearset is of the three-speed selective type. The wheelbase is 105 and tires are 36 by 4 inches.



UPPER CORNER—KNOX TORPEDO—LOWER CORNER—MARMON

# The Accessories

IN the following six pages is given a review of numerous motor car accessories which were not seen at either of the New York shows and which accessories are of the usual varied type, so that no classification of them has been attempted. Owing to the increasing number of western manufacturers exhibiting at New York from year to year the list of new Chicago accessories grows annually smaller and smaller.

**Twentieth Century Motor Car Supply Co.**—Chief among the accessories shown in this stand is the Williams windshield in five styles, which include the company's original road vision shield and a universal automatic folding shield which folds over the hood. Style B is an entirely new type of universal road vision ventilating shield. Of interest to aviators is the shield designed for use on the aeroplane. In addition the company also shows the new Q-D demountable rim and a new type of steering gear.

**Norton Co.**—This display consists of an exhibition of motor car parts—crankshafts, piston pins, camshafts, etc.—that are ground on the Norton plain grinder. Besides this there are special-shaped wheels which are used by factories in different grinding operations. A universal tool room grinder also is included in the display.

**Standard Varnish Works**—On view are finished panels which show the different shades of body finish possible for the use of this company's finishes. These panels are finished in the same manner that car manufacturers use the goods, so that interested persons may secure an idea of how the completed product will appear.

**Overland Sales Co.**—Among the different specialties shown by the Overland Sales Co., manufacturers' sales agent, to the jobbers and manufacturers of motor car sup-

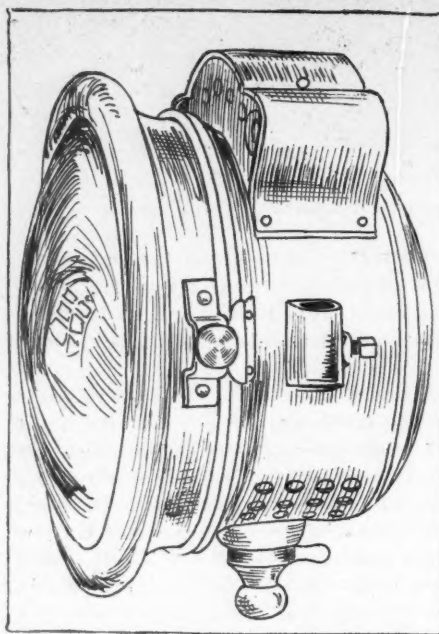


FIG. 1—DIAMOND SHORT-FOCUS LAMP

plies, is found a new idea in a windshield, the operation of which is decidedly simple. This is a rotary action ball-and-socket device of simple construction, which works automatically and can be operated with one hand. It can be used either in an upright or zigzag position by simply changing the spacing in the slots in the disk which received the ball. Further changes may be made in the angularity of the upper or folding section of the shield by shifting the disk around on its hexagonal support, which brings the slots in a different position relative to the stationary section of the shield. The ball is pressed against the face of the disk which contains the slots by means of a spring, the tension of which is adjustable. Another new thing in this line is the Casgrain speedometer, the operation of which is effected by the revolving of a paddle with four blades in a Russian mineral oil. The revolving of the paddles forces the oil against the cylinder, revolving the same on a spiral which is held to the speed at which the machine is traveling. Vivax storage batteries also are shown, lighting up new and novel styles in electric lamps. The essential features claimed for the Vivax battery are efficient lighting qualities, non-corrosive terminals, no leaky jars and long life service. The process of manufacturing the grades is such that the active material cannot drop out. Hopewell Brothers' tire

cases also are displayed, which are constructed in an endless pattern without buttons, lacings or straps. These cases are water-proof and fasten by means of a continuous coiled piano wire spring, which is sewed into both sides of the case. Among the regular styles of lamps on display are new styles of gas lamps of the short focus type with condensed front lenses known as the Diamond short focus head light, and manufactured by the Chicago Auto Lamp Works. These lamps are constructed of extra heavy gauge drawn shells, equipped with margin mirror reflectors and 8-inch plano convex lenses in front, which intensify and project a powerful light. One of these lamps is shown in Fig. 1.

**Chicago Wind Shield Co.**—Among the several types of windshields manufactured and shown by the Chicago Wind Shield Co. two styles are illustrated in Figs. 4 and 5, known as the Dixey and the Chicago-matic windshields. The Dixey windshield is an inside folding shield so constructed as to be rattleproof. This style is intended for cars that require the fold to be made on the inside, owing to the fact that on some cars the hood is made close up to the dash, in which case the windshield would interfere with the raising of the hood. The double fold permits it to fold towards the driver and pass the steering wheel. It is not necessary to reach over the front to operate it; nor are there any thumb screws to be taken out. The entire operation, including fastening and unfastening, can be done without leaving the seat. This shield can be used on any make of car; is brass-bound, with 3/16 by 3/4-inch half oval brass molding; all corners are reinforced with brass corner plates, and 1/4-inch plate glass is used, which is set in felt in a heavy metal channel running through the center of the shield. An adjustment attachment

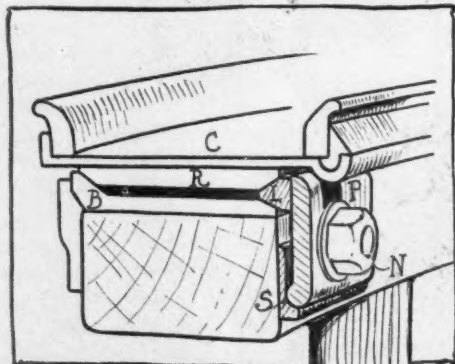


FIG. 2—GOODRICH DEMOUNTABLE-DETACHABLE

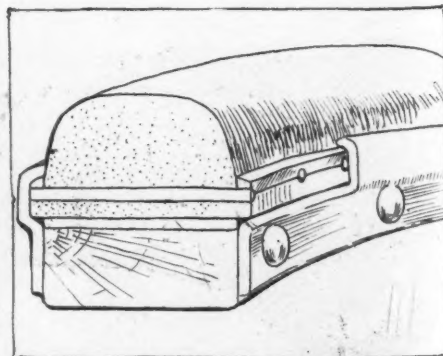


FIG. 3—FIRESTONE SOLID TIRE



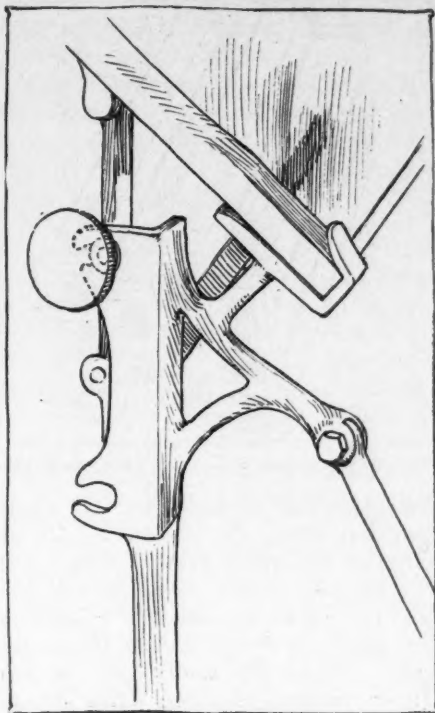


FIG. 4—DIXEY WINDSHIELD

and rest is also provided so that the top portion of the shield may be fastened at an angle in stormy weather. The Chicago-matic style is made of practically the same material but, as the name implies, is automatic in operation, without any thumb screws or wheels; it being simply required to take hold of the top and pull it down, or if down to pull it up and back into place. The top half hinges at H and the upper half is held in the vertical or folded position by means of a spring and plunger in the cylinder, C, which is pivotally mounted at its lower end and flexibly attached to an angular arm of the upper half, as illustrated in Fig. 5.

**B. F. Goodrich Co.**—An interesting addition to the Goodrich line for 1910 is the detachable demountable rim brought out for the first time by this company. This rim is suitable for the use of the company's quick-detachable or straight clincher tires, the illustration, Fig. 2, showing it arranged for the quick-detachable type. This rim has a band, B, shrunk

on the wheel felloe, the band carrying the usual flange on the inside, against which the rim C rests. A ring arm is secured to the inner side of the tire rim C and this rests against the flange on B, and also against a double cone-faced ring which is wedged between the rim C and the band B by action of the nuts on the end of the transverse bolts. These nuts exert their pressure on the ring through lugs, P, which rest on a curved seating, S, so that while the nuts are being tightened there is no binding, the shoulder, S, acting as a hinge. These lugs or plates are slotted so that it is not necessary to entirely remove the nuts from the end of the bolts in order that they may be removed.

**Firestone Side-Wire Flange Tire**—A demountable side-wire tire for commercial vehicle users which is a prominent part of the Firestone exhibit at the Chicago show, is being publicly offered by this company for the first time this year. It is claimed that these tires have been in continuous and successful use on dozens of trucks for about 3 years and their merits thereby thoroughly tested. One compound of regular Firestone rubber stock is used throughout, to insure a maximum amount of wear and protection to the mechanism of the car from the shocks of road travel. The construction of the tire is similar to the regular side-wire tire, except that there is a flange attachment which renders it readily demountable, and that the side wires are four-sided and vulcanized in the tire instead of round and requiring subsequent application. As shown in the section illustrated in Fig. 3, the resilient rubber body of the tire is mounted on a heavy fabric base, which is reinforced by transverse wires placed at intervals of about 1 inch apart around the whole circumference of the tire. The ends of two of these have been made visible in the illustration by cutting away a section of the inner flange. The inner side wire is also clearly shown, and the bevel on its upper exposed side contacts with a corresponding bevel on the inner lip of the flange, which when tightly drawn up forms a secure and water-proof joint. With this tire a repair or replacement may be made readily without

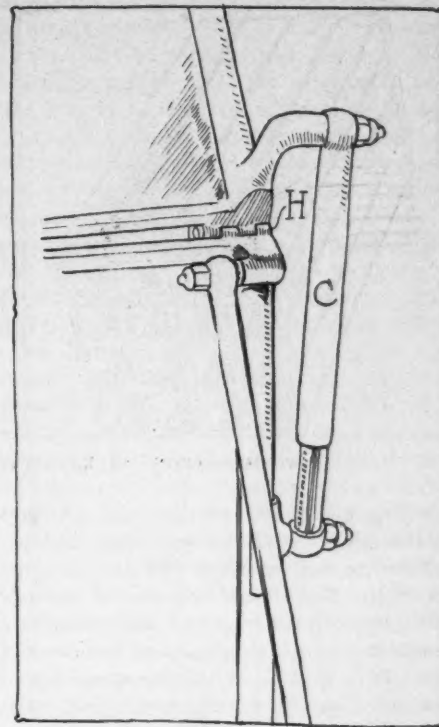


FIG. 5—CHICAGO-MATIC WINDSHIELD

removing the wheel from the car, and without the use of special tools, a monkey or socket wrench being all that is required.

**Vanguard Mfg. Co.**—The Zig Zag windshield, Fig. 6, made by the Vanguard Mfg. Co., is a novelty in that the lower or angular portion is fitted with a removable curtain of water-proof silk mohair or pantasote. The lower or slanting portion of the frame is made of Shelby seamless tubing, which is very rigid, and enameled. The upper half as well as side arms and friction joints are of solid brass, well finished and highly polished. Plate glass 3/16 inch thick is securely held in grooves in the frame by a spring bronze sub-channel; and the removable curtain may be made of any material preferred. By means of friction disks and thumb screws the upper portion of the screen may be readily set at any angle, and if desired the lower water proof covering can be loosened at the sides and rolled down or removed entirely. The advantages claimed for the

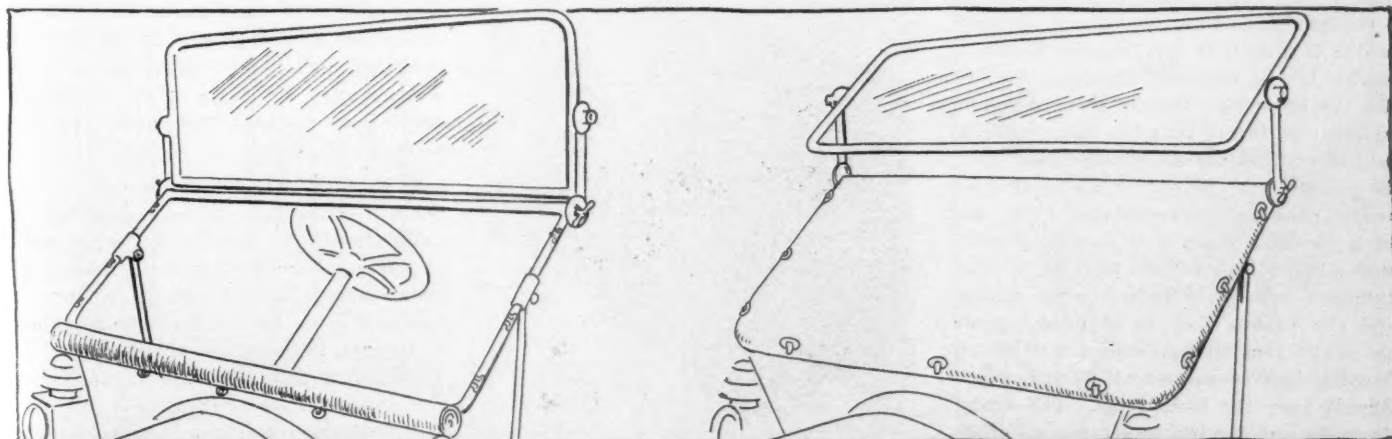


FIG. 6—ZIG-ZAG WINDSHIELD MADE BY THE VANGUARD MFG. CO., SHOWING ITS VARIED POSITIONS

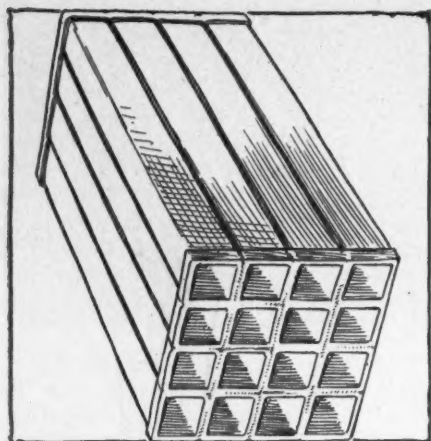


FIG. 7—LOCKPORT MERCEDES-STYLE RADIATOR

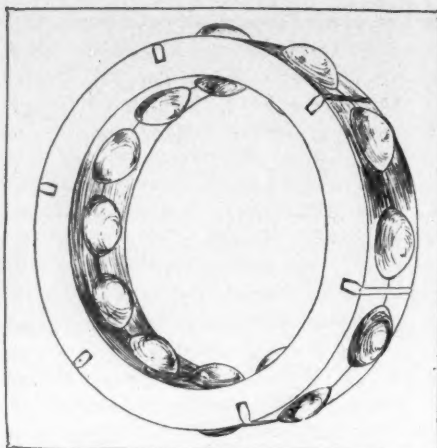


FIG. 8—F. & S. BALL BEARING

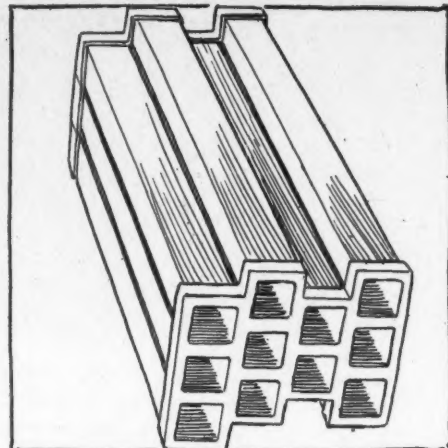


FIG. 9—LOCKPORT STAGGARD TYPE RADIATOR

Zig Zag windshield are that: It may be folded down out of the way very quickly, yet it does not interfere with the opening up of the hood in getting at the engine. With the curtain in place and the glass vertical, one is well protected from wind and cold in winter. With the curtain down and the glass in a vertical position, one can get plenty of fresh air and still have the face and eyes protected from bugs and wind. And with the glass set at an angle parallel with that of the curtain or thereabouts, one may have a clear view of the road, and still be protected from rain or snow.

**Imperial Brass Mfg. Co.**—In addition to the line of articles in drawn, pressed and cast brass, bronze, copper and alloys of these metals quite too long to fully enumerate that are made by this Chicago concern, it recently has brought out a double-cylinder, double-action compound air pump for inflating motor car tires, and a new type of pipe union known as the Imperial compression coupling. The line is essentially the same as last year, the principal articles being compound foot and lever pumps, dash, hand pressure and oil pumps, centrifugal circulating pumps, centrifugal gasoline strainers, pressure regulators, auxiliary gasoline tanks, combined priming cups and relief cocks, pipe unions and connections, lamp brackets, robe and foot rails, windshield fittings, name plates, electric lamps, hood fasteners, grease cups, and so on. The principle of the double-cylinder, double-action compound air pump, which is known as the Imperial-Wixon, is shown in the sectional drawings, Fig. 12. On the up stroke, the air from the outer cylinder is forced into the inner cylinder and this makes the first compression about 30 pounds. On the down stroke this 30-pound pressure is compounded to a very high pressure, which is conducted by an inside tube and rubber hose to the tire. The cylinders are heavy-gauged brass tubing, and the rubber hose is of a high-grade pneumatic tool tubing, with a well-known Imperial hose connection at the end, which threads over the tire nipple. The heavy black lines in the cut indicate the leather plungers used as packing. The Imperial

compression coupling is particularly adapted for connecting up tubing used on the gasoline and oil lines of gasoline motors, and among the advantages of this type of coupling may be mentioned: that no soldering or flaring out of the tubing is required, and no threading is necessary, as one has but to simply cut off the tubing as desired and tighten up the nuts. The several parts of this coupling consist of a main body or nipple, two tapered sleeves, and packing nuts as shown in Fig. 13. In use, the end of the tubing is slipped through the nut and through the tapered sleeve into the body of the coupling till it strikes the shoulder; and the operation of tightening the nut automatically compresses or swedges the tapered end of the tapered sleeve in the tubing itself, thus fastening the tubing without any soldering, brazing or any other operation being necessary.

**Long Mfg. Co.**—In addition to the three types of radiators which comprised the Long line for 1909, a new type will be manufactured and marketed this year, on which patents have been recently obtained. For the season of 1910, then, this company has four types of radiators—a vertical round-tube design with corrugated spiral fins, a vertical flat-tube style with the fins arranged to give a diamond-shaped cellular or honeycomb appearance, a vertical flat-tube type with the fins arranged for a square-tube cellular effect, and the

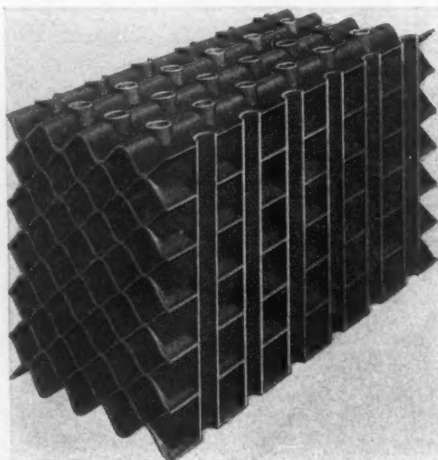


FIG. 10—LONG TYPE OF RADIATOR

new round-tube pattern with continuous horizontal corrugated fins, a section of which is illustrated herein. The spiral tube has been manufactured by this concern for years and consists in securing corrugated fins wound spirally around the tubes. The flat-tube honeycomb type has narrow vertical channels which extend from the base of the radiator to the water tank at the top. These are separated by crimped fins, which are continuous vertically and when in place give the radiator a diamond-shaped cellular appearance. The construction of the square-tube cellular type is similar to that of the one just described in that the water is conveyed through flat vertical tubes extending from top to the bottom with the additional facility of transverse currents at three divisions which extend horizontally across the radiator and the exception of straight flat fins, which are continuous horizontally, giving the square-tube cellular effect. An advantage of this type of radiator is that should any of the sections, into which it is divided by the transverse water channels, become injured, they can be removed and repaired or replaced while the other sections are left intact. The latest Long radiator, as illustrated, Fig. 10, consists of a series of round vertical tubes extending from top to bottom and separated by corrugated fins which are continuous horizontally, and perforated so that in assembling the radiator a single long corrugated fin is slipped over the entire series of tubes. The corrugations of each fin are opposed to each other to bring about a cellular construction, and when the radiator is assembled it is dipped in solder so that all connections between fins and tubes are substantially made.

**R. A. Hardy Co.**—The main idea in the Sta-Rite spark plug is the central bolt or electrode which is even with the porcelain, and by capillary attraction the lubricating oil upon the plug is drawn away from the bolt and down the sides of the porcelain. There are three types of Sta-Rites, the Vulcan, Venus and Gotham. The Vulcan has a double porcelain with a porcelain cap protecting the inner heated tube; the Venus is a mica plug, the core of which is



made without the use of shellac or other sticky substances; while the Gotham is of the single-porcelain type.

**Fulton-Zinke-Hussey Parts Co.**—In addition to the general line of motor car and gas engine equipment handled by the Fulton-Zinke Co. in 1909, the Fulton-Zinke-Hussey Parts Co., known as the F-Z-H Parts Co., has taken on for the 1910 season the Lockport radiator, oilers and distributing gear pumps manufactured by the McCanna Mfg. Co., imported B. K. F. radial ball bearings, a full line of magnetos and Hussey lamp brackets. The Lockport radiators are of the genuine cellular or honeycomb type made in four distinct styles. Their important feature is their light weight and comparatively high cooling efficiency, brought about through the peculiar construction of the little square tubes employed. The construction of the old style Mercedes radiator manufactured by the Lockport company is illustrated in Fig. 7, and consists of a series of the square tubes assembled so that both the horizontal and vertical water spaces formed are in line. In the new Massive staggered type of radiator made by this company and shown in Fig. 9, it will be seen that there is a positive horizontal flow of water over the sides of the tubes as well as a vertical flow; and it is claimed that the increase in efficiency of the staggered over the Mercedes type of radiator is between 15 and 20 per cent. Both the staggered and the Mercedes type are made in two styles, known as the old style and the new Massive style, the only difference between the two being the impressive solidity of the soldering at the ends of the cells. This

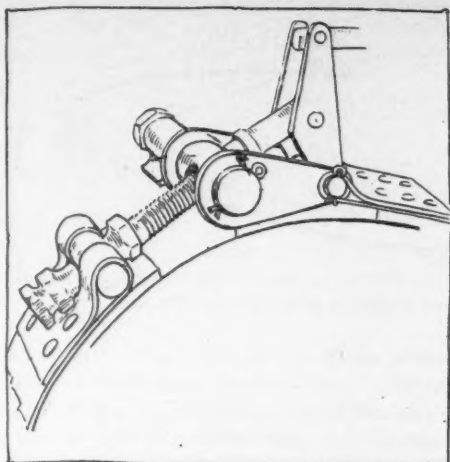


FIG. 10—THE DUPLEX BRAKE

is clearly shown in Figs. 7 and 9, Fig. 7 being of the old style and Fig. 9 of the new Massive style. Each tube of this radiator is made from a piece of flat copper sheet with a fold  $\frac{3}{32}$  inches wide at either end. This is then formed into a square tube and the seam double-creased and hand-soldered. It is by means of the double thickness at the ends of the tubes that the water spaces between them are formed when the tubes are assembled. Five types of oilers and a distributing gear pump are handled by this company, which are made by the McCanna Mfg. Co. The distributing gear pump, mechanically illustrated in Fig. 18, is of the type generally used on all circulating or self-contained systems. It is made with any number of leads, each of which is absolutely positive, so that no two leads are open at the same time, and the pump takes up no more space than a regular gear pump. The oil is taken into the pump through the regular inlet opening, A, is forced by the gears C and D through the channel, CA, cut in the cover into the hollow shaft HS, the openings of which register. This hollow shaft revolves, opening and closing the discharge ports, which are located in the sleeve around the shaft, and as the ports in the shaft and the discharge ports register, the oil is forced on to its destination. Of the five types of oilers three are intended for motor car use and one is manufactured exclusively for motor cycles. The first of the motor car oilers is type A, designed for use on the dash of the car. It is a multi-feed mechanically-driven type and feeds by suction from an auxiliary oil tank carried anywhere on the car. The discharge capacity of the pump is double the suction

capacity, which insures a clear sight-feed at all times. This oiler is made with any number of feeds desired and owing to the auxiliary supply tank the mechanism on the dash is limited to the pumping parts. The type B, designed to be located on the motor, is operated by springs and cams, and has been on the market for several seasons. Type H is a regular double-plunger pump with a reduction possible on the suction only, the discharge plunger always working to its full capacity. The model K is a new mechanical valve lubricator designed for internal combustion engines. The cam operating the plungers gives them the up and down stroke and also rotates them to register with the proper ports. When the plunger is at the bottom or end of the down stroke, it is turned so that the plunger and inlet ports register, and they remain in this position to the end of the upper or suction stroke. It then is turned so that the plunger port and discharge port register, which position is maintained to the end of the downward or discharge stroke. At no time are the inlet and discharge ports open simultaneously, so that it is impossible for the engine to draw or syphon oil from the reservoir. A few changes have been made in the model H lubricator for 1910 so that instead of having the sight-feed housing removable it is made stationary, and adjustments are made outside of it; valves are inserted in the casting which acts as the pump barrel; plunger packing has been discarded, plungers are now made from drill rods, and barrels are reamed to an accurate fit. The discharge valve also is weighted so that no spring valves on the engine are required. The B. K. F. radial bearings consist of two annular rings of

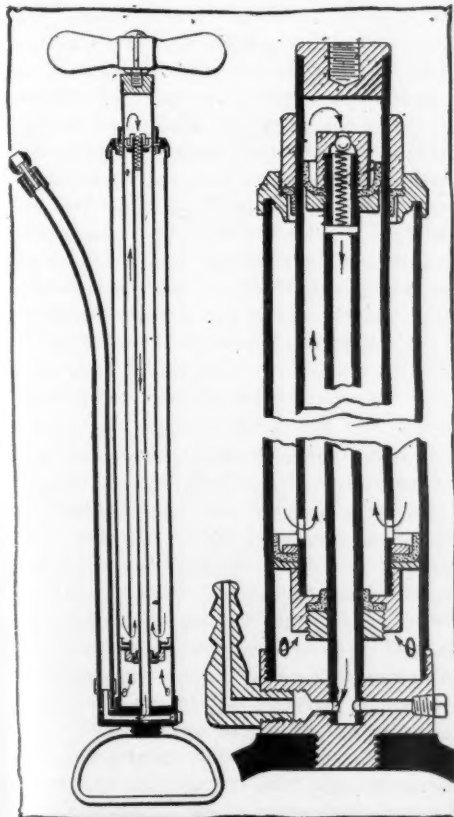


FIG. 12—IMPERIAL-WIXON PUMP

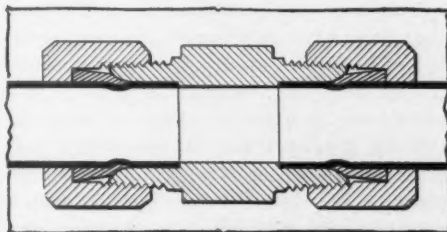


FIG. 13—IMPERIAL HOSE CONNECTION

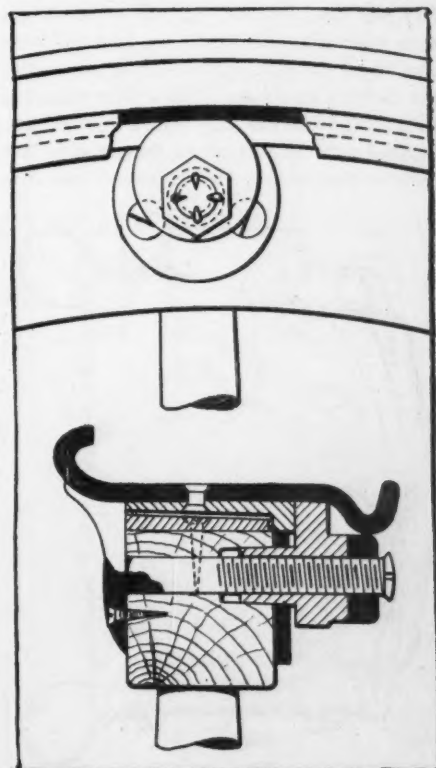


FIG. 14—SECURITY DEMOUNTABLE RIM

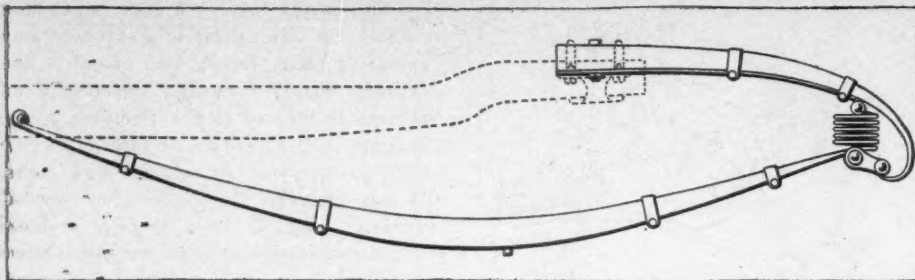


FIG. 15—SHOWING TRIPLE ACTION SPRINGS OF THREE-QUARTER ELLIPTIC SCROLL TYPE

special steel, case-hardened but very tough, and of balls made from a high carbon arcible steel, hardened and accurately finished. All bearing surfaces, and both the inner and outer diameters, are ground true to gauge with a toleration less than a 2-1,000 of an inch and the balls are separated from each other and contained in ball baskets which consist of one solid steel ring, properly machined to receive the balls, with a protecting ring fitted in a groove, which is provided with means for holding it securely in place. The B. K. F. bearing is shown in Fig. 20.

**Point Spark Plug Co.**—One of the new ideas in the spark plug line is the Point spark plug, the feature of which is the gap, an accessory devised to enable the users to determine at any time the condition of the spark. The body of the gap is composed of a hard fiber inside of which is a glass tube. One end is capped with brass and through it passes a Bessemer steel rod which has a lock nut on its outer end. The secondary wire attaches to this and a hole is bored through the fiber at right angles to the long access, which is threaded to fit the top portion of the central electrode of the spark plug. There is a 1/8-inch hole bored through the fiber, showing the end of the Bessemer steel wire connected with the secondary wire and set at a distance of about 1/8-inch from the central electrode of the plug. As the commutator makes the contact the spark jumps from the secondary terminal to the central electrode. At the same time the

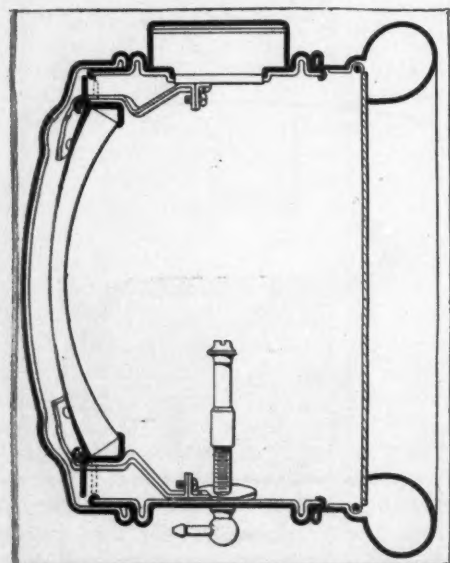


FIG. 17—THE MANHATTAN LAMP

spark occurs inside the engine. By this means it is discovered whether or not the plugs are working properly, it will show a loose wire, a poor contact in the commutator, a short-circuited plug, and the condition of the coil.

**S. Brakestone**—Besides showing the Haggstrom spark plug and inside blow-out patch, Mr. Brakestone also exhibits the transmissions, clutches, universal joints and lever sets made by the General Mfg. Co., the Shawmut spark plug, and the hose clamp, terminals, and tire irons made by B. Morgan. Interesting in the display is a tire accessory which is designed to assist a person in putting on tight clincher casings without assistance from anyone else. It is in the shape of a hook, attached to which is a leather strap. By putting the hook of the tool in the clincher rim, passing the strap around the tire and felloe, hooking the free end of the strap which is pulled fairly tight onto a button on the tool, the casing is held in place until the operation is complete. The Shawmut plug has an insulated core with an air space on the ignition end and which is tapered with the idea of preventing short-circuiting of the plug. The sparking points are made of Meteor wire, while the porcelain is doubly insulated from the shell by copper asbestos gaskets which will allow no direct bearing on the metal part. The shells are of steel.

**Ross Gear and Tool Co.**—Steering gears and differentials make up this line, the company making steering gears for both pleasure and commercial vehicles. The commercial car steering gear is tapered and keyed to the tube, the lower end of the tube being brazed to a steel tube which when turned by the wheel gives a longitudinal motion to the phosphor bronze sleeve, which is threaded to receive the screw and has spirals on its external surface. These spirals have a very rank lead in comparison to the threads on the steel screw. A malleable iron housing has spirals on its interior which engage the spirals on the phosphor bronze sleeve, therefore, when this bronze sleeve is given a longitudinal motion by the steel screw it also is given a rotative motion by the spirals on its exterior. Besides being interiorly threaded the bronze sleeve contains a number of straight internal keyways. The lower steering arm which projects half way up into the gear has keys built on its surface which fits the

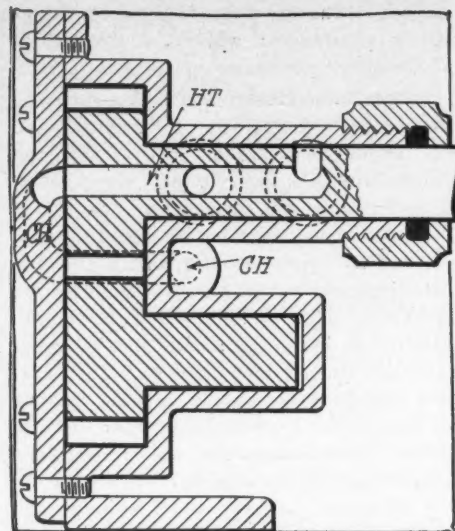


FIG. 16—MCCANNA DISTRIBUTING GEAR PUMP

keyways on the bronze sleeve so when the sleeve is given rotative and longitudinal motion it rotates the steering arm. This difference in the pitch of the steel screw and the bronze sleeve causes the gears to be irreversible in their action.

**Fellwock Automobile and Mfg. Co.**—In addition to the Fellwock windshield, the company also shows single rumble and double rumble seats which are designed to give extra seating capacity to small runabouts. Underneath the seat is a tool box, the seats being hinged to tilt forward so access may be had to the tools. The seats are made of 22-gauge metal, reinforced with hardwood and each seat is ironed for a top.

**Universal Tire Protector Co.**—An improvement is noted in the 1910 Universal adjustable full tread tire protector, the new idea being a tube ratchet connection and adjustment provided instead of an open channel ratchet connection. Instead of open hooks along the tread margin through which the tension band passes, there is a closed or loop hook which prevents any part of the tread being detached while in service. A heavy stud head rivet armor has replaced the double burr rivet armor, it being claimed that the new style will not injure the tire in any way, even should it be worn down to the quick in excessive service. In addition to this, there is a demonstration made of the Universal emergency tire sleeve.

**Randall-Faichney Co.**—Jericho exhaust horns, B-line, oil and grease guns, Webster gauges for gasoline tanks and vulcanizing thermometers are shown by this firm. The Jericho horn, as is well known, is an exhaust signal operated by a pedal and which is attached back of the muffler. It is made in four sizes for the different types of cars. In operation the depressing of the pedal closes the horn lid, forming a slot through which the exhaust is directed across the sound-chamber opening. As the lid is released the exhaust has full outlet toward the ground, the sound-chamber opening being downward. The grease gun



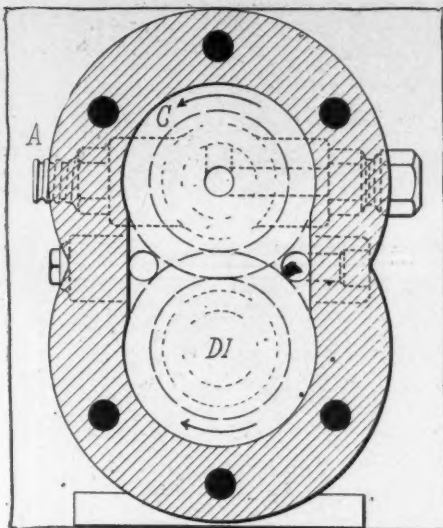


FIG. 18—McCanna Distributing Gear Pump

is made from metal with every piston ground to fit its individual barrel, the piston rods being of Bessemer steel while the barrels and tips are made of seamless brass. On the piston rod is a square thread which is engaged by a lock nut and when this lock nut is pushed back to the handle tip the plunger is free for the handling of oils and light greases. For use on heavier graphite the lock nut is engaged upon a threaded shoulder on the barrel head which brings about a powerful compression. This style is termed the Boston combination. The Boulevard type is intended for the heaviest greases and does not have the thread and piston rod.

**Gates-Osborne Mfg. Co.**—The manufacturer of tops is the main business of this concern, and the exhibit consists of the display of the line which it takes. The feature in this connection is a front visor which is so adjusted as to closely hug the windshield, with quarters so fastened as to admit the side curtains under the quarters, which not only gives a neat appearance but prevents the curtains from blowing in or out. The tops are strongly cross-braced with Scott stout webbing and firmly padded, there being an extra amount of cross webbing in the deck. There are large triangular celluloid side lights, the size of the opening between the bows while the light in the rear curtain is partitioned in six sections.

**Royal Equipment Co.**—This concern in its Duplex brake shows a particular delicacy of adjustment which is illustrated herewith in Fig. 11. In the illustration the brakes are shown in tightened position, at which time the vertical cross head is pulling almost at right angles, which is the position of greatest advantage.

**Haggstrom Brothers Mfg. Co.**—Besides the Haggstrom inside tire sleeve this concern also has brought out a new idea in spark plugs, the main feature of which is the porcelain guard which acts as a direct agent for the prevention of a short-circuit. The Haggstrom patch consists of a sleeve which fits on the inside of a casing and

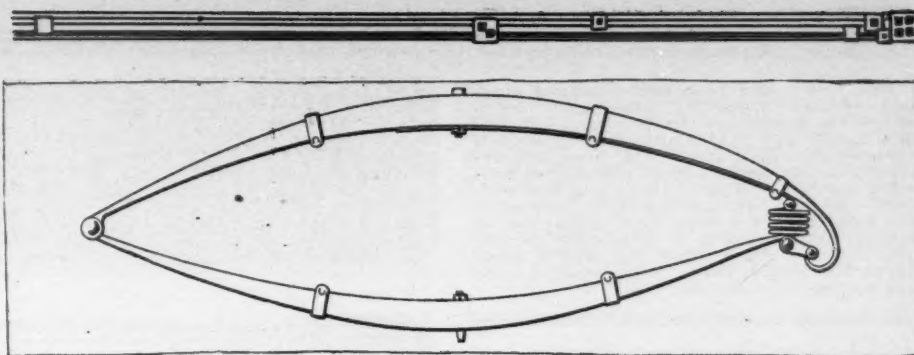


FIG. 19—SHOWING METHOD OF ATTACHING TRIPLE ACTION SPRINGS

which is held firmly by means of a metal hook underneath the tire, which prevents the patch from creeping and also stops it from being blown through the hole in the casing which it is intended to plug up. An improvement for 1910 is a fabric flap that goes under the bead of the tire on the opposite side from the hook and aids the patch in holding down a blow-out.

**Auburn Auto Pump Co.**—The Ten Eyck pump is of the self-contacting type, the feature of which is a double-cylinder attachment designed to make the operation of the pump automatic and positive. The pump is operated by means of the flywheel of the engine, the friction wheel on the pump being brought into contact with the flywheel, which puts the pump into action. Attaching and detaching the tube starts and stops the pump automatically, except when the tire is entirely deflated, when the operator brings the friction wheel into contact with the revolving surface by a lever device which act produces sufficient air to cause the back pressure piston to hold the friction wheel in contact.

**Triple Action Spring Co.**—The 1910 line of the Triple Action Spring Co., Chicago, includes several new styles of supplementary spring attachment, and a new demountable, and demountable detachable rim for motor car wheels, which recently have been invented and protected by Samuel Furnidge of the Triple Action Spring Co. In Figs. 15 and 19 is shown the company's latest method of fitting its supplementary springs to riding springs of the three-quarter elliptic scroll type. Unlike the systems used by this company in previous years, the springs now are arranged and designed for compression instead of extension, a feature which adds to the life of the springs, and greatly facilitates their application. They can be fitted to any type of riding spring, and, as shown in the illustrations, their application to the most common types of full and three-quarter elliptics, is obtained by simply adding an extra half leaf to the rear and lower section of the upper part of the spring, with an eye for the attachment of the upper end of the coil spring. This construction permits of fitting the supplementary springs without in any way altering the springs themselves. The new demountable rim, which is manufactured by the Security Rim Co., is illustrated in Fig. 14, and although it is not greatly unlike other demountable rims on the market, a number of advantages are

claimed for it, among which are: that each fastener works independently, so that there is no possibility of the rim sticking from an accumulation of dust, the regular clincher or quick-detachable rim can be used, and there are no parts to lose, as the nuts on the end of the stay bolts can only turn back half a turn, permitting the cams to turn in the opposite direction and loosen the rim. The cams are flattened on the top so that when all are in contact with the rim they cannot turn without the use of a wrench.

**Vehicle Top and Supply Co.**—This St. Louis concern shows a line of tops, making a feature of those tops in which mohair fabrics are used.

**Turner Brass Works**—Samples of Turner specialties are shown, making a big line in which are found the Harroun bumper, step plates, radiator name plates, brass railings, and a hundred and one other things of interest to the motor industry that this company makes.

**Manhattan Screw and Stamping Co.**—This concern is marketing a new design in headlights, which is a double-shell lamp in that the entire lamp is made of double metal, in which one shell supports the other. All couplings are on the inner part of the body, leaving a very clean and compact exterior. An illustration of this lamp, shown on another page, Fig. 17, shows the intricacy and delicacy with which the double scheme has been carried out, as well as the plain exterior of the lamp.

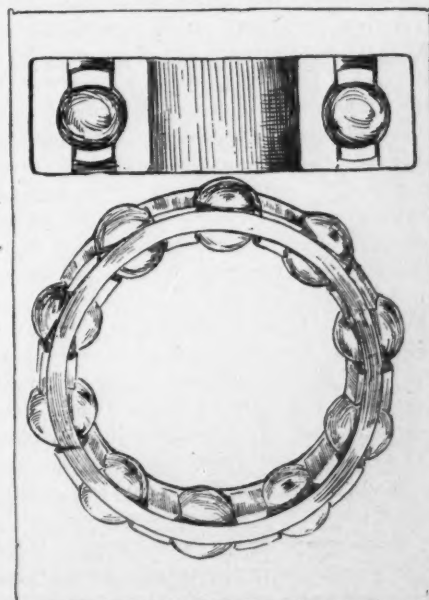


FIG. 20—B-K-F RADIAL BALL BEARINGS



Fig. 1—An idea of a well-displayed stock can be had from this illustration, which shows the interior of the Standard Automobile Supply Co., of Chicago. System prevails throughout. The stock has been departmentized thoroughly and in the various sections are to be found all the parts that pertain to any particular article. Notwithstanding the fact there are thousands of articles in the store, it is possible to find any one of them without any loss of time, so carefully has the scheme been worked out by the management.

PERHAPS Chicago isn't the center of the car manufacturing industry as is Detroit, but the Windy City derives considerable satisfaction from the fact that it probably does a larger business in the wholesaling and retailing of motor supplies than any other city in the country. At least eight big concerns make their headquarters in Chicago and an idea of the magnitude of their business may be had when it is known that in 1909 the estimated volume of business done by these eight houses amounted to \$4,000,000, of which sum about one-fourth came in as a result of the retail trade.

Handlers of motor supplies now pursue entirely different methods of doing business than in the earlier days of the industry. An example of this may be noted in Chicago where the average retail house is systematized and departmentized as carefully as that of any mercantile place inside of the loop. As an example of this one Chicago supply magnate recalls how he started in 1903 in a little store 20 by 25 feet in which he displayed about 200 different articles. Now his gigantic establishment is packed to its fullest capacity with supplies of all sorts and in his catalog there are listed more than 1,000 different articles which are used by motorists. In addition to a retail business he sells goods by mail and through the medium of Uncle Sam receives from 500 to 1,500 orders a day from this source.

In other ways than this the business has changed. No longer are exorbitant prices charged and in consequence of this simmering down the profits of a concern of this sort have been reduced wonderfully. Whereas a few years ago there was from 100 to 200 per cent profit on all goods sold, nowadays your big supply magnate claims that he is making less money in proportion than, for instance, a company of the same size which sells clothing. He says a clothier will make more money out of an overcoat than he will, selling the same garment. In pointing out the difference between 1907 and 1910 he claims that the reason for the high percentage of profit 2 years ago was that then goods were produced in small quantities which of course increased the cost of production. Now the business of manufacturing supplies have been standardized, the weak concerns weeded out, and the survivors are far more conservative now than formerly.

Three years ago a retail supply house felt it could cater to its trade by carrying an assortment of spark plugs, some few samples of tires, tire repair kits, tool kits

## Modern Methods of



FIG. 1—SHOWING INTERIOR OF SALESROOM OF THE STANDARD AUTOMOBILE SUPPLY CO. OF CHICAGO

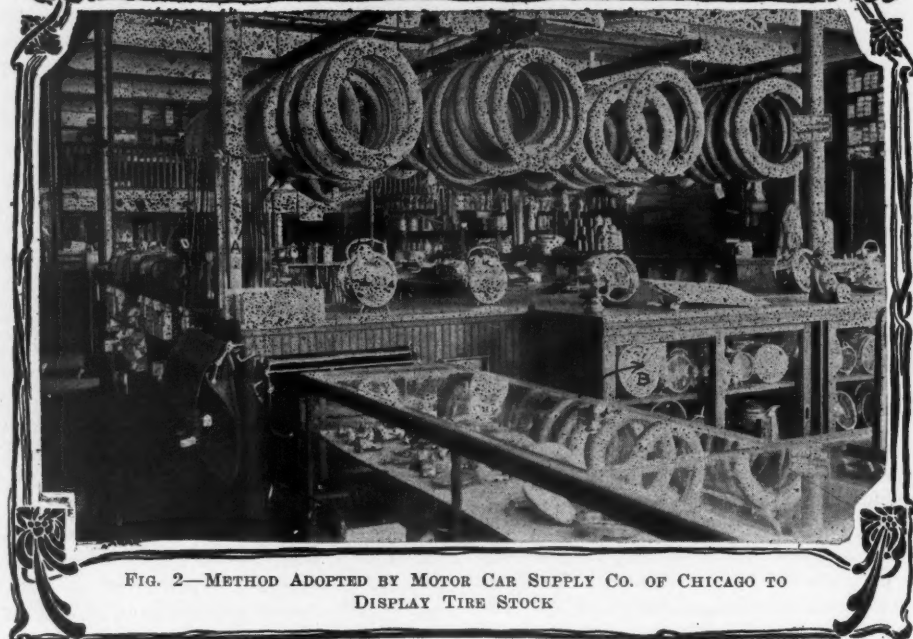


FIG. 2—METHOD ADOPTED BY MOTOR CAR SUPPLY CO. OF CHICAGO TO DISPLAY TIRE STOCK

and a small stock of caps, gloves and dust-ers. Nowadays it is necessary to carry from 1,500 to 2,000 different articles in order to be classed as up-to-date. In addition there must be several different departments which include a complete hardware store in itself, a clothing store and a tire supply house, while the sundry part of the business is decidedly in the minority, so to speak. In the hardware department are found wrenches, repair kits, new bolts, nuts, screws, brass screws, clasps, drills, locks, braces and bits, files, saws, hammers, vices, taps, dies and hundreds of little things that formerly were regarded as un-

Fig. 2—In the salesroom of the Motor Car Supply Co. the same systematization has taken place. "A place for everything and everything in its place" is the motto followed here. The illustrations show the system employed, A being the manner in which the stock of tires is kept, and B the section in which gas headlights are displayed. In the rear is to be seen a balcony which also serves as an auxiliary stock room. Underneath the tire racks is the storage battery department.

necessary for the supply house to handle.

The electrical department has outgrown its spark plug days, and in it now are found switches, bulbs, wires, electric horns, electric lights, and limousine electric signals. In addition there is a miscellaneous



# Selling Motor Supplies



FIG. 3—HARDWARE DEPARTMENT AND SMALL ACCESSORIES IN STORE OF EXCELSIOR SUPPLY CO., CHICAGO



FIG. 4—GARAGE MAINTAINED BY EXCELSIOR SUPPLY CO., CHICAGO, FOR CUSTOMERS' CONVENIENCE

Fig. 3—The scope of the supply business has been extended to such an extent that now a concern to be up to date must maintain a variety of departments. The Excelsior Supply Co., of Chicago, has a department given wholly over to hardware, A, where everything in that line can be found. In the illustration, B shows wooden spools carrying a stock of rubber hose, while C is a case which contains trays full of such articles as spark plugs, wrenches and various other articles of the kind.

department which caters to other wants and here are found tubs, sponges, galvanized pails, chamois, wash aprons, scrub brushes, feather dusters, whisk brooms and there even is a soap branch which includes all kinds of soaps and polishes. Then, also,

there is a speedometer department which is complete in itself.

In the old days it was thought sufficient if a supply house simply carried a few samples of tires, but nowadays it has been found necessary to carry almost as large a stock as does the branch house of some big tire manufacturing concern. This is found necessary in order to give quick service and from the fact that many tire branches close Saturday afternoons and Sundays just at the time when tire demands are heaviest. There is one concern in Chicago that has in stock at the present time \$10,000 worth of casings. True, it does not

Fig. 4—To save customers time and expense the Excelsior Supply Co., of Chicago, maintains a garage in the rear of the store into which a customer may run his car for the purpose of having it equipped, free of charge, with any article he may purchase, such as speedometers, windshields, tires, electric lighting systems and horns. This is an innovation which is greatly appreciated by patrons of the establishment, who heretofore have had to go elsewhere to have such articles fitted and to pay for the work.

need so many, but the outlay was made because of the wisdom of the manager, who foresaw a rise in tire prices and laid in a stock, the sale of which will insure this concern a big profit. As he has an excellent stock room the tires do not deteriorate because of being kept in stock for 4 or 5 months. It is a far jump from the \$500 outlay required in previous years for tire samples to the \$10,000-mark made in this case, but it only goes to show how system is prevailing in the modern supply houses.

One of the results of the desire to keep abreast of the times is seen in one big store, which is unique in that it has established a garage in the rear part of its building, which is operated solely for the convenience of its patrons. It is not a garage in the ordinary sense of the word, but is a big room in which a customer may drive his car and leave it to be equipped with some accessory. For instance, this house will sell an article, and will apply it free of charge. It fits bumpers, horns, speedometers, trunk racks, clocks, tire irons and glass fronts without charging extra for the service and in this manner not only saves its customers considerable money but also saves him time. Another advantage of this private garage is that a customer purchasing a new casing can run his car into the garage and have the change made by the company's workmen free of charge, thus securing the same kind of service he would have if he had made his purchase from a regular tire house. Also here is a compressed air tank for the purpose of filling the tires with air.

The idea of this garage came to the manager one day after he had sold a \$5 horn to a patron, and this patron had to pay \$7.50 to another concern to have it fitted. This resulted in the establishment of the garage and since it has been opened this manager finds that it has brought him considerable new business and has more than paid for itself, despite the fact that he has to keep two men working in it all the time.

Another Chicago concern does a mail order business as well as a retail one, and its experience has shown that it is possible to sell anything from a cotterpin up to a portable garage with the assistance of Uncle Sam. As mentioned before, this concern has received as many as 1,500 mail orders in a day, and this branch of the business is big enough to be a business by itself. Of course, most of the mail order business comes from the country districts, and it is evident that nowadays the country motorist has kept fully



Fig. 5—The clothing department of the Motor Car Supply Co., of Chicago, is located in one corner of the salesroom, from which it is separated by glass partitions. In this little room there is kept a full supply of motoring clothing, as well as lap robes and caps. This room also has plenty of shelf room for the storage of surplus stock, while the glass windows furnish plenty of light for the inspection of the goods. It is a small clothing store in itself, and is somewhat of an innovation.

abreast of the times. Formerly he was given to buying the cheaper articles, but as he has progressed from the small car to the higher-priced one he has found his sundry needs increasing in proportion. Now he wants standard goods and is willing to pay well for them. Perhaps the only difference between city and country motorists is that the former is more given to the purchase of luxurious motoring apparel than is the country owner. The latter goes in for the more substantial sundries and it is noted that there are more electric vulcanizers sold in the country than in the city, probably caused by the fact that in the country the motorist is not in easy reaching distance of tire repair houses. The country trade also shows a liking for second-grade tires, it being possible that the ruralite sees a chance to save a few pennies in tire upkeep.

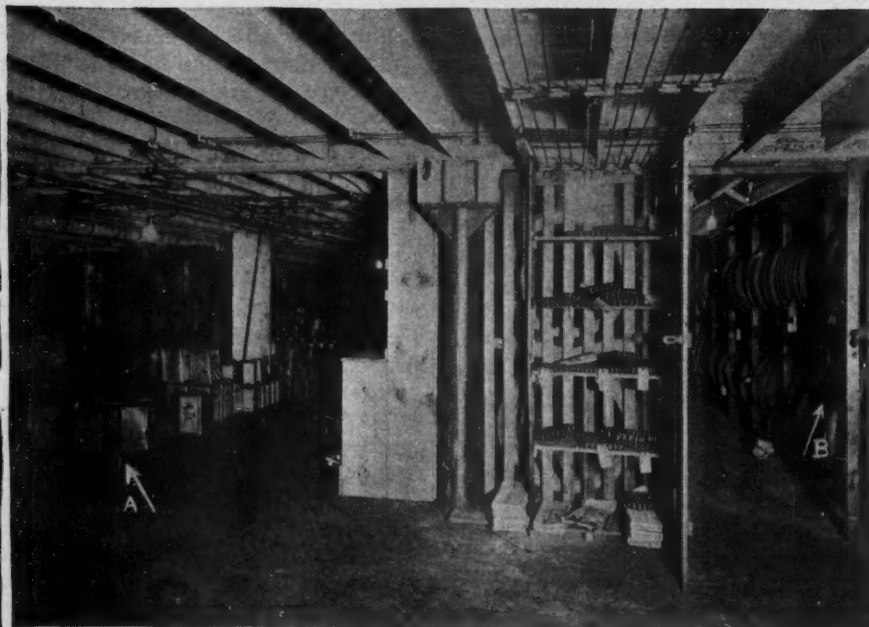


Fig. 6—Generally the basement of a supply house is a catch-all for everything, but such is not the case with the Excelsior Supply Co., of Chicago, which has a basement under its retail store in which system prevails. A shows a section where lubricating oil is carried. It will be noticed that everything is in plain sight, so that accurate tab may be kept as to the condition of the stock. B shows the tire room, which carries a \$10,000 stock, and which is protected by means of a door which can be locked.

This mail order house covers a territory from Ohio west and adopts the same system in vogue in mail order houses which do not make a specialty of motoring sundries. On an average of fifteen to twenty salesmen from manufacturers of sundries visit this mail order house daily and few of them go away empty-handed, so an idea of the magnitude of this business may be had from this. Mail orders are filled the same day they are received, and buying in this manner also permits of a customer returning goods that are not satisfactory and getting credit for the same.

Still another Chicago concern has brought out new ideas in the way of shipping out its goods, a method which it thinks saves a possible loss of any article. In its shipping room is a long bench on which are placed two rows of wooden bins. Above each bin is a bill clip which holds the order. The man filling the order



Fig. 7—The Standard Automobile Supply Co., of Chicago, has made a step forward in systematizing its stock room. In order to prevent complaints because of failure to completely fill an order a table runs the length of the room, and on it are bins A. Above each bin is a bill clip, B. An employee filling an order hangs the order in the clip and as he places an article in the bin he checks it off on the bill. In this manner he is sure to give each customer just exactly what is ordered, thereby preventing complaints.



Fig. 8—System also prevails in the salesroom of the Automobile Supply Co., of Chicago, which recently moved into a new building which is especially adapted to the supply business. Racks and show cases in the salesroom enable the company to display its goods in an attractive manner. A in the illustration shows the storage room for trunks and tire cases. B is one of the show cases in which such small articles as speedometers and clocks are shown. Tool boxes are also very much in evidence.

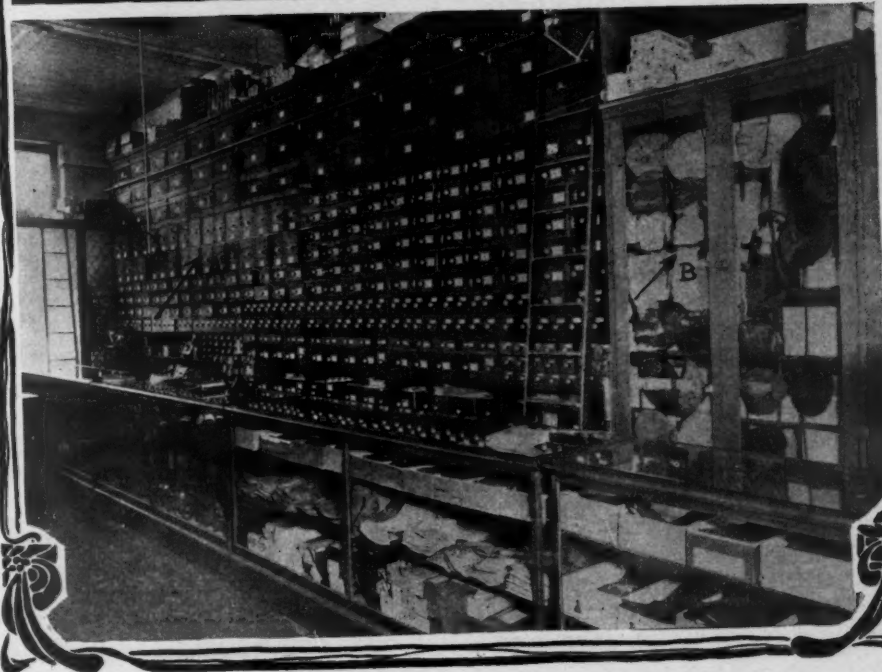
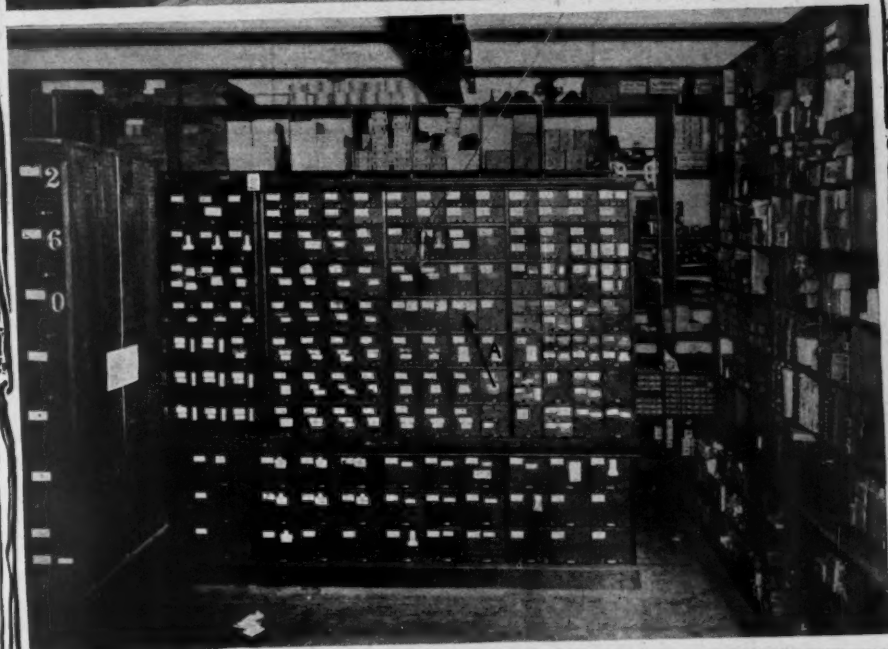
checks off each article as he gets it from stock and places it in the bin. In this manner he has a check that insures everything ordered being sent out of the house.

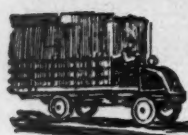
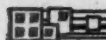
"To open a first-class supply house in a large city like Chicago requires an outlay of at least \$50,000," declares the manager of one of the most prominent concerns in the Windy City. "That is an immense sum but the investment is a good one provided the house does not adopt any get-rich-quick methods. The motorist of today has had his eye teeth cut and he knows prices almost as well as does the dealer who may buy wholesale from the same concern. The owner wants value for his money and he strenuously objects to paying exorbitant prices demanded 4 or 5 years ago. It has been my experience that the retail buyer is divided into three classes. First comes the man who buys a

Fig. 9—On the second floor of the Automobile Supply Co., of Chicago, is the stock room, the feature of which is the series of cases, A, in which are carried the supply of small accessories such as spark plugs and the like. Each article has a separate drawer, and on the front of each is a picture of the article, which is a great time-saver in that it is possible to find goods without opening a dozen drawers to locate the article. This idea works well in actual practice, and is greatly admired.

low-priced car, when he really cannot afford to own one, and who buys sparingly. This man generally is a great fault-finder and is given to returning goods after he has tried them, which of course gives us considerable trouble. In the second class is the man who buys a medium-priced car. He knows prices and he is willing to pay for what he gets. He gives us very little trouble and is a man whose business is well worth the having. The third class is made of the rich men who know the motor car only as a rapid method of transportation, who leaves everything to his chauffeur, and who pays his bills generally without question. Of course, there are exceptions to every rule and, perhaps, I am a little rough on the little fellow. Some of my best customers are found in this class, but, on the whole, the business I secure from this source is small in volume and gives me considerable trouble."

Fig. 10—In a big supply house it is necessary to use system in caring for small articles, so the Motor Car Supply Co., of Chicago, has constructed in its salesroom a series of drawers, A, in which are carried such parts as bolts, nuts and screws which enable a salesman to find an article without any loss of time. B shows a cabinet in which are kept caps and gloves, while high show cases afford room for the display of many other articles common to the stock carried by such a concern.





# The Realm of the Commercial Car

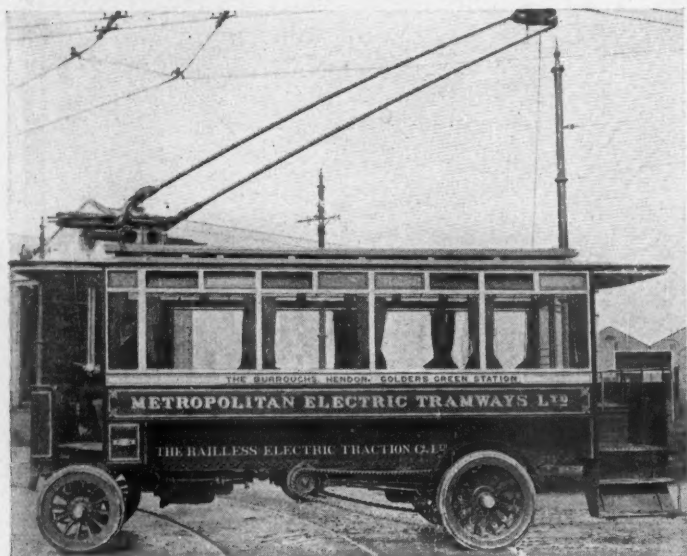


FIG. 1—TYPE OF ELECTRIC BUS IN USE IN ENGLAND

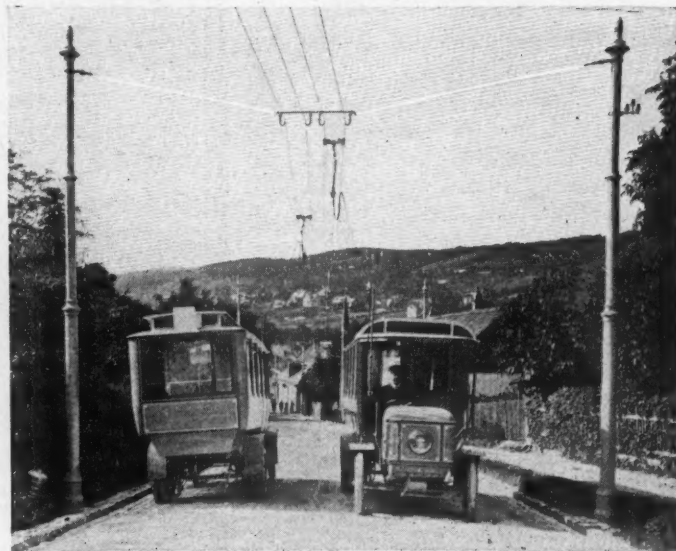


FIG. 2—TRACKLESS TROLLEY IN OPERATION IN AUSTRIA

TWO years ago in these pages Motor Age drew attention to the hold that the trackless trolley then was gaining in Austria and certain parts of Germany. Since then attention has been drawn to the fact that the trackless trolley has gained headway on the continent, having been introduced in Italy. Now this week its progress in England is dealt with. One advantage of the trackless trolley, as already stated, is that it can be used to advantage in residential sections of cities and towns where the objection to having street car rails laid in the street is great. With the trackless trolley the road equipment is confined to a pair of overhead wires, one for the out-current and another the return, so that the circuit may be completed. It is needless to say that a system of this kind is particularly cheap to install, and also cheap to maintain in that the cars travel over the ordinary macadam or brick-paved streets, and can wind in and out among traffic and move considerably to either the right or left on the overhead conductors.

Another advantage of the trackless trolley is that the weight of the passenger car can be reduced to a minimum in that a storage battery has not to be carried, the only equipment being an electric motor, which in some makes drives to the four wheels of the car, whereas in others drive to the rear wheels only.

The trackless trolley recently opened in England is in operation at Hendon, the line extending between Borroughs and Colder Greens station. This is of the electric type and the car has a 25-horse-power electric motor with the usual series—parallel controller and grid resistance for regulation of speed. The car accommo-

## Trackless Trolley Advancing

dates twenty-two passengers inside, and there are seats for two on the rear platform. It is of the single-deck type and uses twin solid rubber tires on the rear wheels.

The route at Hendon is in the shape of a letter U with a turning place at the end of each leg and with curves of more or less severe character throughout the line. For this reason high speed running is not possible except on one or two of the straighter portions of the route. This line is constructed on the twin overhead wire principle, but provision is made at all the points of suspension for the addition of a third wire whenever it is desired, as a

triple-wire system has been devised, which is said to have some advantages over the twin-wire system. The trolley head, Fig. 3, although running on the twin wires only carries its two sets of wheels W and W1, at a sufficient distance apart to permit of the center contact being added when the third wire system is installed.

It is maintained that electric rail-less traction will occupy an intermediate position between electric railways with overhead conductors on the one hand and vehicles with self-contained power supply such as gasoline-electric, storage battery, steam and motor buses, on the other hand. The rail-less trolley car is in reality a self-propelled bus driven by electric motors deriving their power from overhead conductors, and as there are no rails used a

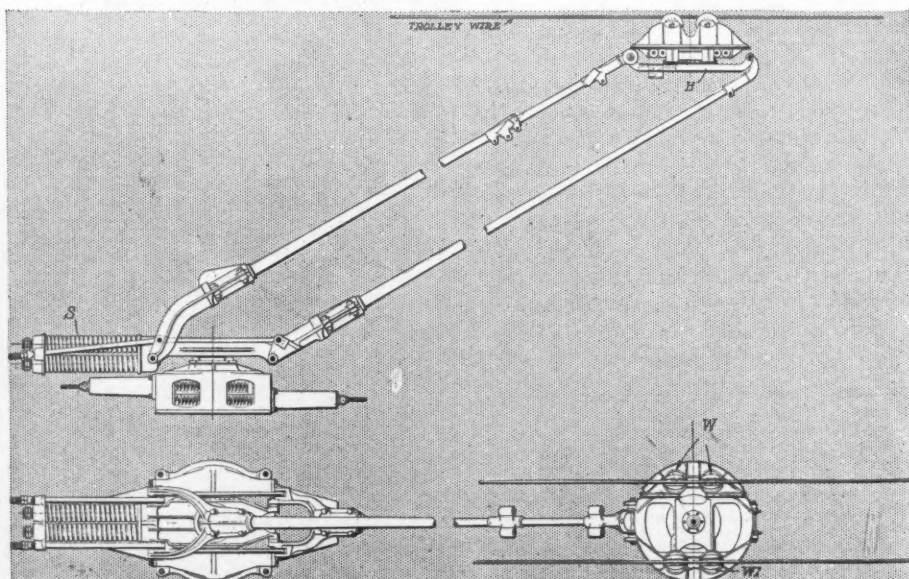


FIG. 3—SHOWING DETAIL OF THE TROLLEY HEAD OR COLLECTOR



second overhead trolley wire is required for the return circuit.

It is stated that the cost of construction is only one-fourth of the average cost of British electric railways per mile as the heaviest items of expense in the latter construction are the tracks and roadbed with the usual repaving of the street required.

The electric trackless trolley car is not confined to a fixed path and therefore can easily accommodate itself to the traffic, passing obstructions without difficulty. The cost of operation is said to be far lower for the trackless trolley, for while the electric power consumption is about the same for both systems the fixed charges are very much less in the case of the rail-less traction system.

The trolley head or collector, Fig. 3, of this trackless trolley line is of the usual under-running type carried at the end of a rigid boom and kept in contact with the overhead trolley wire by powerful springs S in the trolley base. The trolley base and collector are so designed that the head H travels freely under the wires and without appreciable side pressure, at whatever angle the pole may be trailing, from 90 degrees on one side to the same angle on the other. It may be stated that in the triple-trolley system, the head instead of having a single positive trolley wheel, is provided with a pair of positive wheels used for making contact with each of the trolley wires and to insure that the inner wheel may not come in contact with either of the positive wires, the negative wire is supported at an elevation of 7 inches below the positive wire, whereas the negative trolley wheel is mounted in a corresponding position relative to the outer wheels. There are three trolley wheels mounted on a single rotatable head, the two outer wheels being connected together and making contact with the outer or positive wires, and the inner wheel makes contact with the negative or center wire.

A triple hanger is used for supporting the three conductors in order to ensure the proper spacing of the trolley wire. The trolley pole is made up of two separate poles forming two sides of a parallelogram of which the two ends are the head and the



GRABOWSKY IN STREET RAILWAY SERVICE

trolley base. The system installed at Hendon has two trolley wires only, one acting as positive and the other as negative conductor, both trolley wheels being mounted on the rotatable head. Instead of being attached to one of the trolley wheels the framework of the car is connected to the middle of a single-pole double-throw switch by which it can be connected at will to either one or the other trolley wheels. The polarized relay is mounted on the car, one coil of which is energized by the trolley circuit and the other by a small storage battery. In case the single-pole switch is in the correct position to connect the framework of the car to the particular trolley wheel, which is at that instant in contact with the negative or earthed conductor, the relay is inoperative, but should the polarity of the trolley wires be reversed, the relay instantly brings into action an electric device mounted in the front canopy of the car, giving an audible signal to the driver. This alarm continues until the motorman reverses the switch

and transfers the connection to the other trolley wire. Another audible signal notifies the motorman of any injury to the insulation of the motor circuit. This change over switch and indicator or audible signal for the rail-less car is called an electric hooter.

It is stated that experience has shown that the rear wheels should be utilized for propelling a road vehicle, and the front wheels for steering only. If the front wheels are used for driving as well as steering, the weight which they are required to carry must be either insufficient for adhesion or too great to permit of easy steering.

## INTERNATIONAL TRANSPORTATION

The first foreign attempt to compete with railroads in the matter of international transportation of goods has been made by the firm of Waring & Gillow, furniture dealers, having establishments in London and Paris. The ordinary method is to ship goods by rail and steamer, closed vans, capable of being slung from truck to train and from train to steamer, always being employed when a full load is available. As there was a considerable amount of traffic between the London and the Paris houses, and it frequently fell to the firm to make entire household removals, the experiment was tried of shipping entirely by motor car.

After loading at the London house, the driver of the 3-ton truck covered the 80 miles separating the British capital from Newhaven, and there ran the vehicle on board the cross-channel steamer under its own power. On landing at Dieppe, there were custom formalities, naturally, but with the aid of the triptyque system and the facilities which can be established when a regular service has been organized, this should not occasion any serious delay. The run to Paris is over good roads, capable of being covered in 5 or 6 hours by a touring car, but requiring 1½ days for a slower moving van.

In the matter of time the motor service is a distinct advance on the railway, for it is possible to leave London with a full load in the morning and deliver in Paris on the evening of the following day.

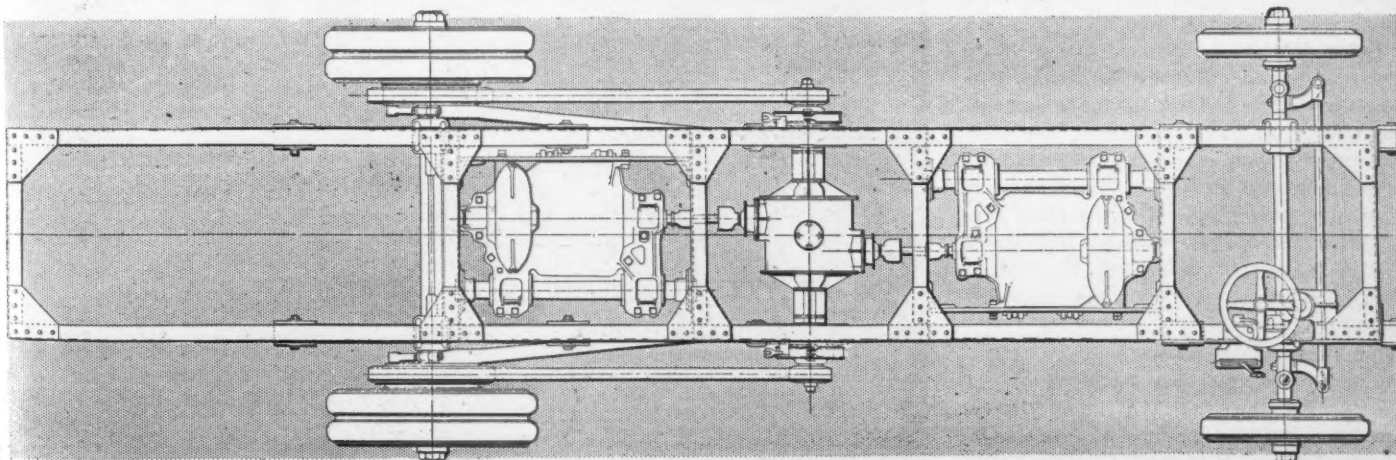


FIG. 4—MOTOR EQUIPMENT OF THE HENDON RAIL-LESS ELECTRIC TROLLEY CARS

# CHICAGO SHOW ISSUE

## Architectural Gem In Store Equipment

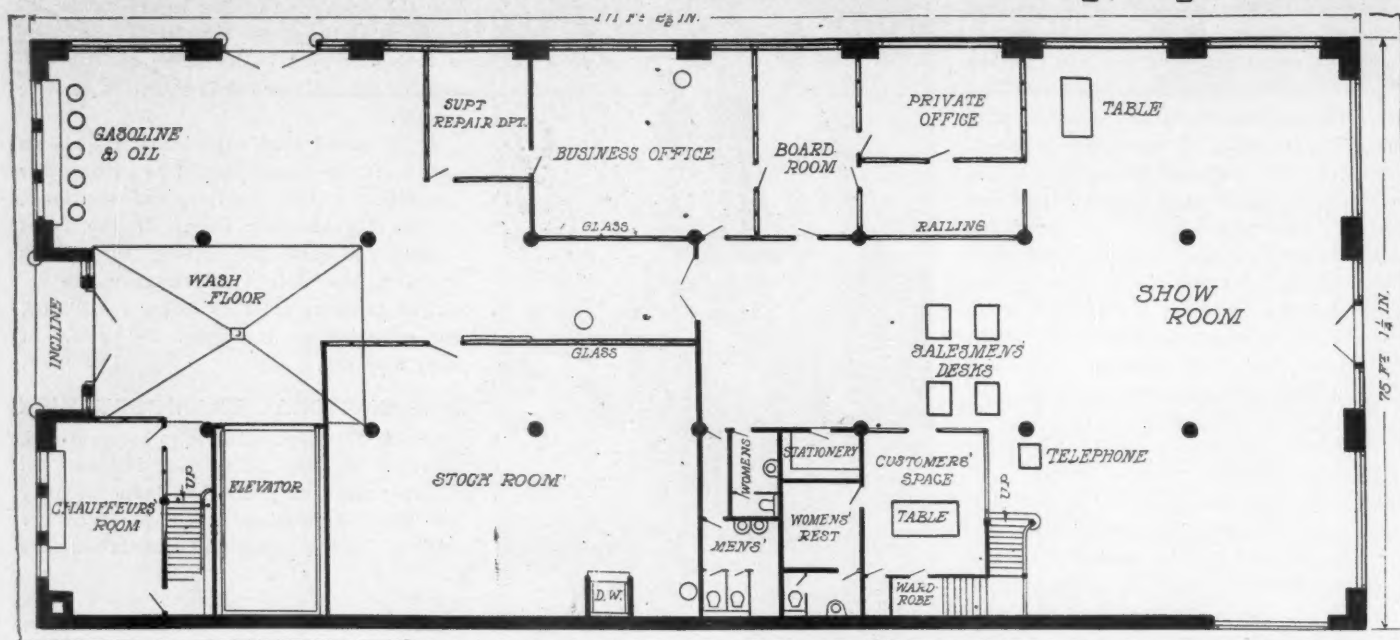


FIG. 1—FIRST FLOOR PLAN OF NEW CHICAGO BRANCH HOUSE OF LOCOMOBILE CO.

THE year 1909 was a momentous one, so far as the selling of motor cars in Chicago was concerned. This was largely due to the shift which took place in motor row. Up to the middle of the season the motor colony extended from Twelfth to Twentieth streets along Michigan avenue, but about this season a few of the dealers conceived the idea of moving south to Twenty-fourth and Twenty-sixth streets, with a view of establishing a nucleus for a new motor row. At first the matter was received in a lukewarm manner by many, but as soon as three or four leaders had completed new buildings and moved into them, the spirit to move became manifest everywhere, and there was a stampede southward, announcements being made every day of some new concern abandoning its old position and joining the new colony.

One of the conservative branches which participated in this movement is that of the Locomobile company, heretofore located in a one-story building at Fourteenth and Michigan avenue, and which erected during the past fall one of the handsomest buildings along the row at Twentieth street and Michigan avenue, three-quarters of a mile south of its old location. This new Locomobile branch, under the management of A. J. Banta, is one of the finest motor car selling establishments, not only in the west, but in the entire country. It is a three-story building, of fire-proof construction throughout, with 75 feet frontage on Michigan avenue and 171 feet on Twentieth street, with three available floors.

### First Floor Arrangement

Fig. 1 shows the general arrangement of the first floor in which the entire front is devoted to one of the finest show rooms in the country, with its hexagonal tile flooring, its walls and ceiling decorated



FIG. 2—NEW LOCOMOBILE BRANCH, MICHIGAN AVENUE, CHICAGO



FIG. 3—GENERAL VIEW OF ARTISTIC LOCOMOBILE BRANCH SALESROOM



with a Tiffany buff, its woodwork of quartered oak, the windows reaching to the floor, radiators inclosed in ornamental oak coverings and office furniture and lighting fixtures in harmony throughout. In the rear of the show room is a group of four desks for salesmen, and near at hand is the telephone exchange. Along the right side as you enter is the manager's office, immediately back of which is a board room, illustrated in Fig. 5. Back of this board room comes the business office, in which is the whole office force. This is unique in this building and when a prospective buyer enters there is not the slightest indication of office hum that so generally accompanies salesrooms. On the left side of the building is a particularly desirable arrangement, designated customers' space, but which really is a lobby for women, and opening off which is a woman's rest room, a comfort not generally adopted in the motor car salesrooms. Suitable wardrobe facilities are fitted and a fire-proof stationery department also is provided.

## No Waste Room

This dismisses the selling and business phase of the first floor, but leaves the large stock room, 48 by 34 feet, the superintendent of the repair department's office, the bank of gasoline and oil pumps, the washing floor, a room at the back for chauffeurs, and the elevator. There is no waste room whatever and the grouping of the business offices on one side is a particularly commendable arrangement. It will be noted that the manager's private office is in direct communication with the business office from the front, and the superintendent of the repair department is located similarly at the rear. It also is a meritorious fact that the business office is one of the best-lighted in the building, so that those who have to use their eyes

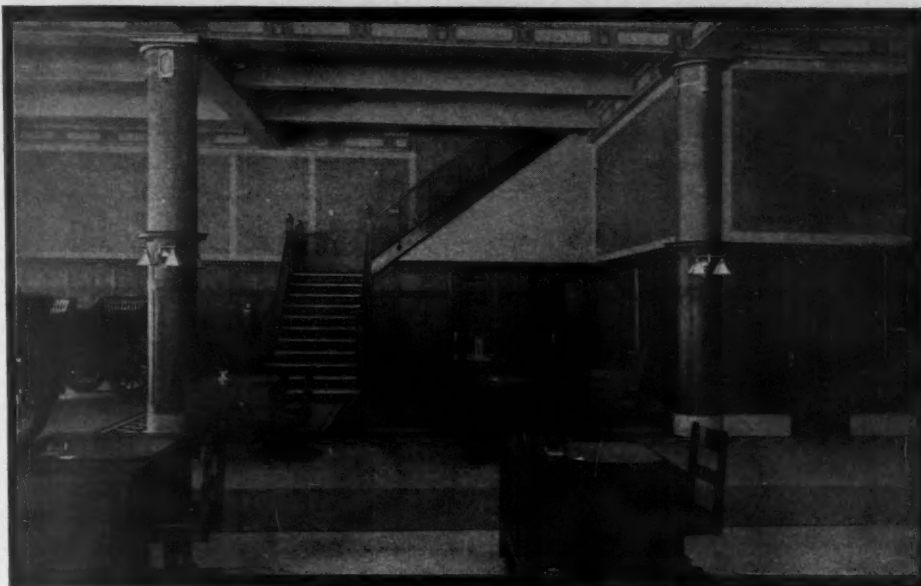


FIG. 4—SALESMEN'S DESKS AND WOMEN'S LOBBY

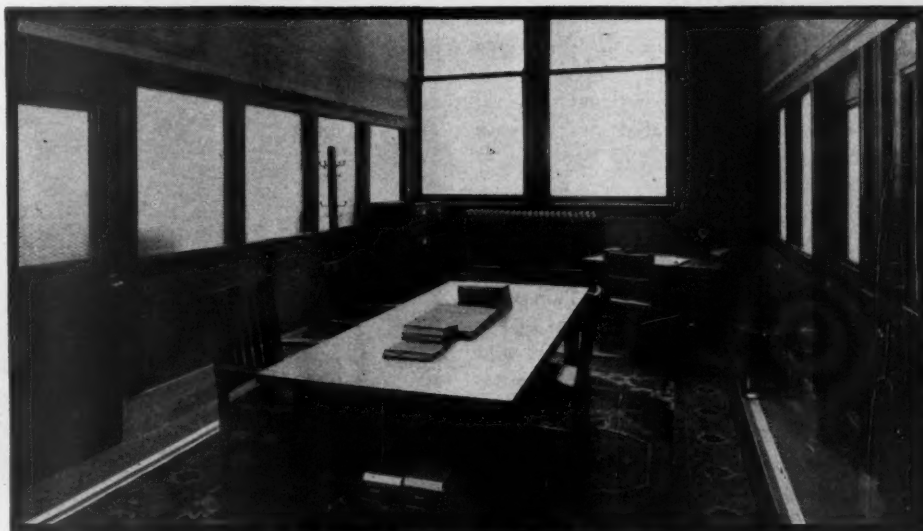


FIG. 5—BOARD ROOM OF LOCOMOBILE BRANCH

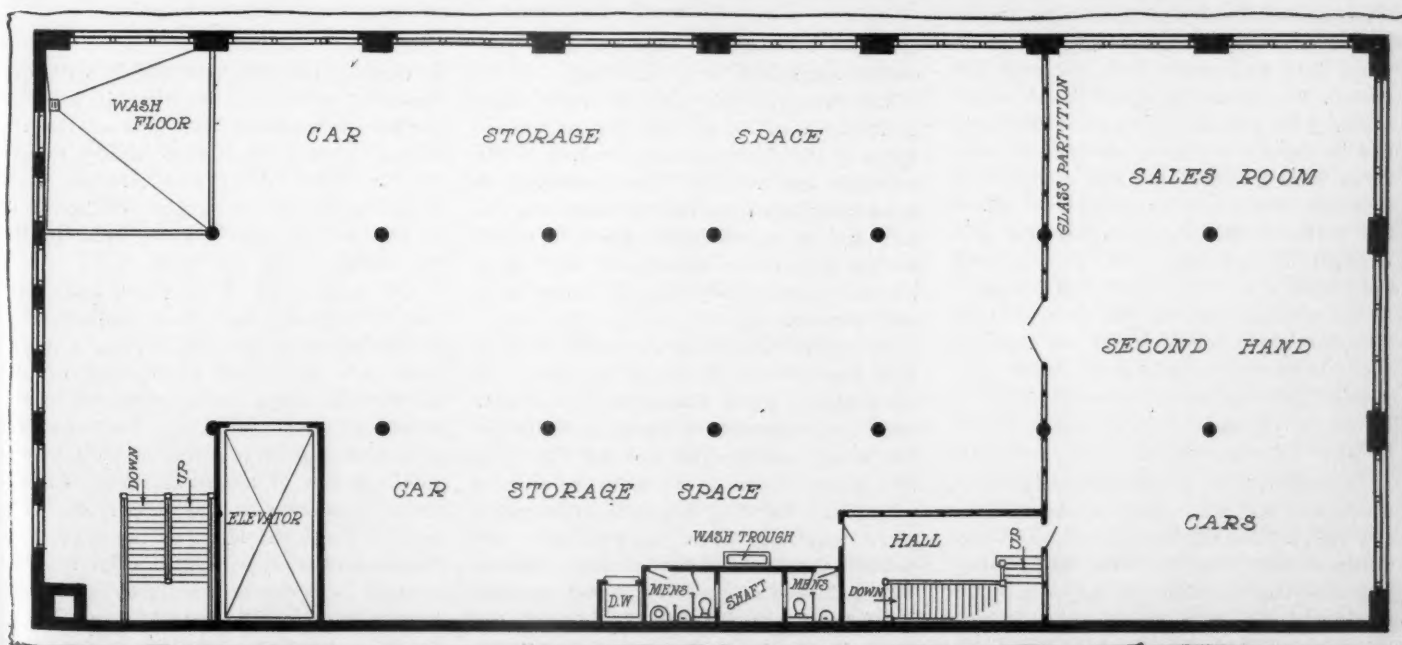


FIG. 6—SECOND FLOOR PLAN OF NEW CHICAGO LOCOMOBILE BRANCH



FIG. 7—SHOWING MANAGER'S OFFICE IN CORNER OF SHOW ROOM

most have the best possible conditions. This fact is often neglected in salesroom design, the business department not infrequently being relegated to beneath some balcony where artificial light has to be used all the time.

Fig. 6 shows a plan of the second floor which is largely devoted to car storage space and in the front of which is a salesroom for fitting second-hand cars. This salesroom extends across the entire front of the building and is fitted with tile floor and office spaces. It is the intention of Manager Banta to store all cars received from the factory and waiting delivery in the storage space on this floor, and it is not to be interpreted that this is garaging facility. There is a wash space on this floor.

#### Layout of Third Floor

A plan view of the third floor is not given, but, roughly speaking, this is divided into two parts—a front room 104 feet in length and designated the repair department, and a rear room 60 feet long and intended for private owners who wish to do work on their cars and can do it in this room instead of on the street. Above the center of this repair department is a skylight 124 feet long which gives a north illumination to the entire repair department, making the use of electric light, except at night, unnecessary. On this floor the machinery, consisting of lathe, drill presses, grinders, etc., is grouped near the front on the left side, leaving the remainder for car repairs.

Figs. 13 and 16, on the following pages, illustrate in detail two departments of the new Locomobile selling room not ordinarily found. Sixteen is the men's lobby and its exact location can be seen by referring to Fig. 1 where the table is indicated in front of the private office of the manager. In addition to the table there

room, and the position in which cars are most likely to stand.

To any Chicago branch house, which has selling territory extending over half a dozen states and embracing a radius of 500 miles, the stock room is the most important adjunct. That car has not yet been produced but which one time or another will not require a spare part, either due to an accident, carelessness of the driver, a defect in the previous part, or the natural wear and tear from continuous usage. In this Locomobile branch the stock room is located on the first floor immediately in rear of the salesroom. It is 48 feet long and 34 feet wide and in it are carried duplicate parts of all Locomobile models from the day of the steam car to the 1910 chassis. Carrying parts for models extending over 10 years and in sufficient quantities for a tremendous territory, is no small task, and it is only made possible by the installment of a system whereby the keeper of the stock room knows automatically where any part may be obtained.

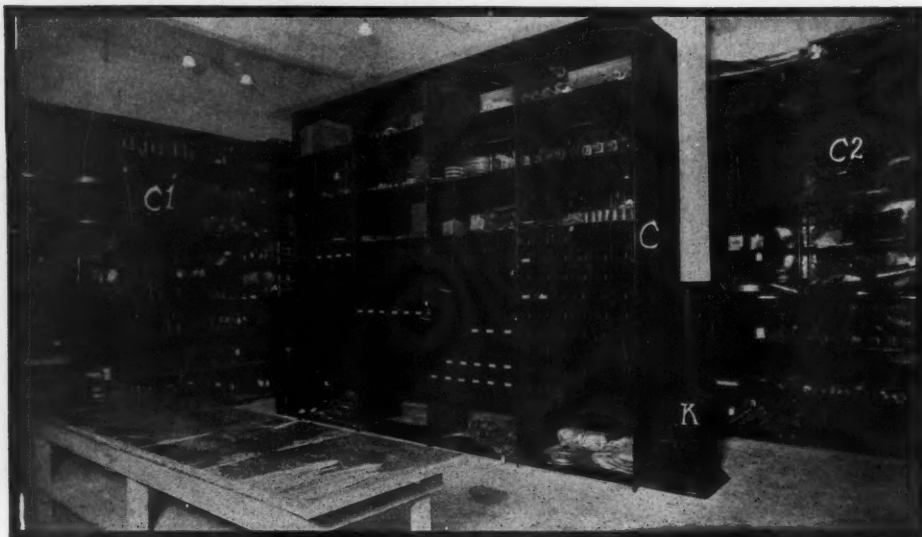


FIG. 8—SHEET METAL SHELVES AND CABINETS IN STOCK ROOM

are such comforts as rugs, couches, easy chairs, magazines, etc., furnished.

The women's lobby and rest room, illustrated in Fig. 13, are marked customers' space in Fig. 1, with a door leading to the women's rest room. This department is more luxurious than that intended for the men and is an admirable place to which women can retire instead of having to lounge conspicuously about in the main selling room.

The entire design of the lower floor, in fact that of the building throughout, is on a higher plane than ever before seen in so comprehensive a branch. Every detail shows forethought, and not that rush and hurry shown in so many salesrooms where the building is made from stock plans purchased from an architect who peddles them to a dozen or more makers. This evidence of prearrangement exhibits itself to the smallest detail; in fact, the tiling in the main show room being patterned in conformity to the shape of the

One scheme adopted to facilitate this work is tagging the different models with different-colored cards, so that if a spare spring were needed from one of the top shelves it would not be necessary to pull half a dozen down and measure their length or count the number of leaves to be sure of the right one, the color of the tag saving all of this work.

But everything in the stock room cannot be tagged, and so a comprehensive system must be installed. Figs. 8 and 9 give two very good conceptions of the Locomobile stock room, with its sheet-metal shelving against the walls and its high towering sheet metal cabinets placed in the center of the stock room. In this room everything is fire proof. Shelving against the walls is all of the open type, two examples appearing in Fig. 8. The case C1 is shown to contain cylinder castings, gears for the gearset, drive chains, sprockets, mufflers and other heavy goods of large size which it would be quite use-



less to keep in drawers such as used on the cases standing in the middle of the room. In the case marked C2, on another wall, appears a variety of other parts, including magnetos, etc. Owing to these photographs being taken before the complete stock room was perfected, the disposition of the many parts is not as some would suggest and is open to criticism. This illustration shows one of the central cabinets C, which has three open rows of spaces along the top, beneath which are ten rows of metal drawers and at the bottom is an open row. The system in conjunction with the metal drawers is that they are reversible end for end, and when stock is carried in any particular drawer, that drawer will have a tag on the end, whereas when it is emptied the drawer will be reversed, exposing the end which is without a card.

## Some Other Features

Fig. 9 shows a different view of the stock room and brings out some features of its contain-all nature. In this illustra-

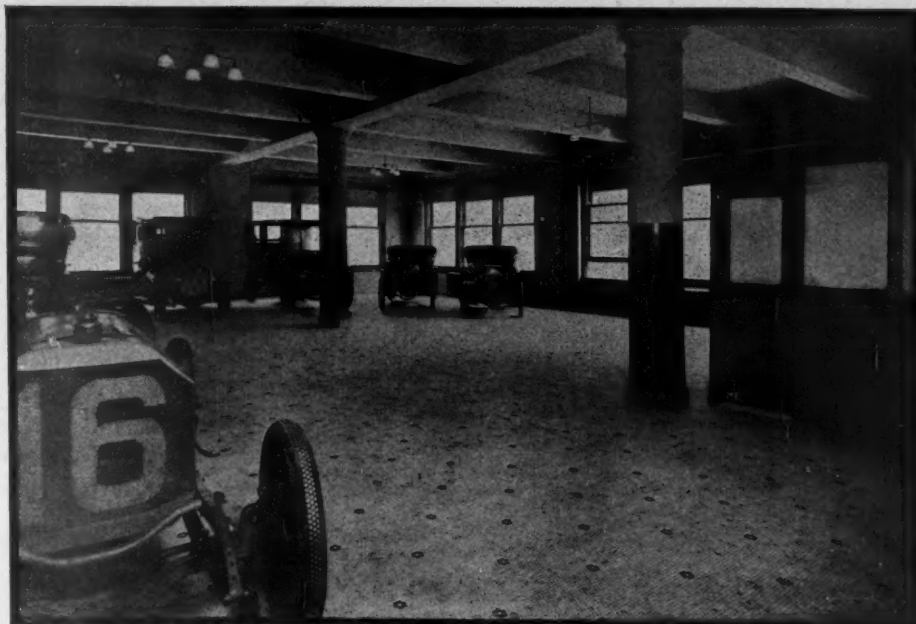


FIG. 9—SALESROOM, SECOND-HAND CARS ON SECOND FLOOR

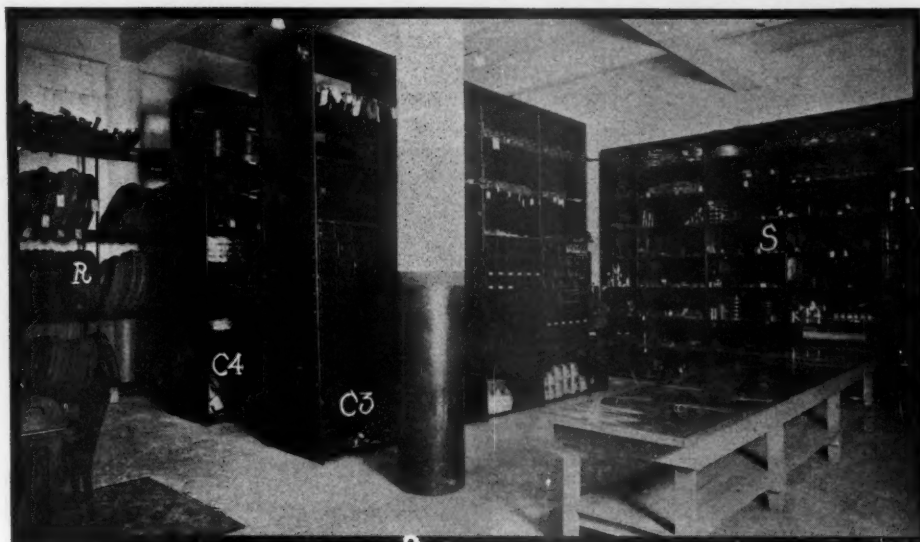


FIG. 10—ANOTHER VIEW OF CABINETS IN THE STOCK ROOM

tion R shows a tire rack on the wall and C3 and C4 are metal cases containing sprockets in the upper rows, and clothing and other necessities in the lower row. C3 is a conventional case carrying a variety of parts needed in the cars. S shows another form of case on one of the walls of the room. In order that the stock room may be accessible to the repair shop on the top floor, a dumb waiter is fitted, by means of which extra parts can be carried up to the repair department.

On the lower floor and conveniently located to the entrance are the gasoline and oil facilities, shown diagrammatically in Fig. 1, and illustrated in Fig. 14. This is a comprehensive Bowser system, in which Fig. 1 is a portable gasoline tank, 2 the gasoline pump, 3 the kerosene pump, 4 non-fluid oil pump, 5 cylinder oil pump, 6 motor oil pump, and 7 a portable tank for cylinder and non-fluid oils. All five of the pumps communicate with tanks

buried in the ground outside of the building, and at the rear entrance is a series of filling pipes where all of them may be replenished.

## Repair Shop on Third Floor

The repair shop, which occupies the forward two-thirds of the third or top floor, is a model of its kind. One cannot but admire the orderly condition and the systematic arrangement of the equipment; the copious diffusion of light, the strong north light coming through the skylight by day, and from the Tungsten lamp equipment by night, and the roominess and the sanity of it are all impressive. A view of this section of the building is shown in Fig. 12. In this illustration the arrangement of the machine tool equipment is seen in the foreground. At the extreme left and front is a power hack-saw H, a short distance behind this and on the wall may be seen the starting-box SB, through which the overhead 7½-horsepower electric

motor EM is controlled; and on the floor near the wall behind, is a medium large drill press. At the front of the next row there is a heavy grinder with two large high-speed emery wheels, and in line behind it, a small milling machine, a universal grinder, and a two-spindle drill-press, respectively, all of which are new and of improved design. Next in line there are three lathes, the first two being 14-inch engine lathes, and the last one a high-speed lathe with a 16-inch swing. At the right of the first engine lathe, in the photograph is a small emery wheel for grinding tools; this completed the machine tool equipment at the time the photograph was taken, at which time a large milling machine, a large arbor press and several other tools were said to be in transit and would soon be in place.

Arranged between the three prominent pillars is a heavy workbench equipped with vises, and with drawers in which the workmen may keep their tools under lock and key. Many other interesting features in the way of equipment are to be found about the shop: There is a large portable crane for lifting motors from their chassis, and transferring them about the shop and to engine trucks on which they are dis-assembled and overhauled; four of these engine trucks are provided, also six specially constructed body trucks with rubber-tired castors on which the car bodies are placed when lifted from their chassis, preparatory to its overhauling.

## An Aerial Pit

One of the most practical and ingenious features of the repair-shop equipment may be seen in Fig. 15, which consists of a steel trestle upon which a car may be raised above the floor as shown. It is provided with a powerful windlass W at one end, and two steel inclined tracks A at the other; these are the means of raising the

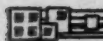


FIG. 11—ENORMOUS CAR STORAGE SPACE IN REAR ON SECOND FLOOR

car upon the structure. The advantages of this contrivance are, by far, greater than those of the pit, with the general disadvantages of a pit eliminated; it admits plenty of air and light, four men work under one car at the same time without inconvenience, and stools are provided for the workmen, which are fitted with leather cushions, on which the workmen may sit while at work under a car. Furthermore, the entire structure is mounted on castors so that if necessary it may be readily moved, car and all, to any part of the shop.

Passing toward the rear of the shop, attention is called to the International Clock Co.'s card system, by means of which an accurate record of each employe's time is obtained. When a man is assigned to a job he slips his time card into a slot in the clock, pushes down on a lever and the time of day is stamped in the column for which the clock is adjusted. Having completed, or being called from, a job, he again registers the time in the proper space upon the card.

#### All the Conveniences

Next, on the left, are the toilet rooms, well-ventilated, with extra bathing facilities on the outside. Behind the toilet room on the left is located the tool room. The tool room is thoroughly provided with all special tools, a place for everything, and everything in its place. A toolmaker is in charge to keep the tools in first class condition, and a checking system, such as is used in all up-to-date factories, is employed to keep track of all items given out. All parts or supplies used in the repair department pass through the hands of the man in charge of the tool room; there is an elevator operating between the stockroom on the first floor and the tool room, close tab is kept on all replacements made on cars in the repair shop, and for every article used for this purpose the workman gives his receipt, and for every tool his check. Each workman has a number of little brass checks and for each tool which he obtains from the toolroom he gives one of these checks, which is hung on a little hook in a position indicating the tool given



FIG. 12—MACHINERY IN REPAIR DEPARTMENT ON THIRD FLOOR



FIG. 13—WOMEN'S LOBBY AND DOOR TO WOMEN'S REST ROOM



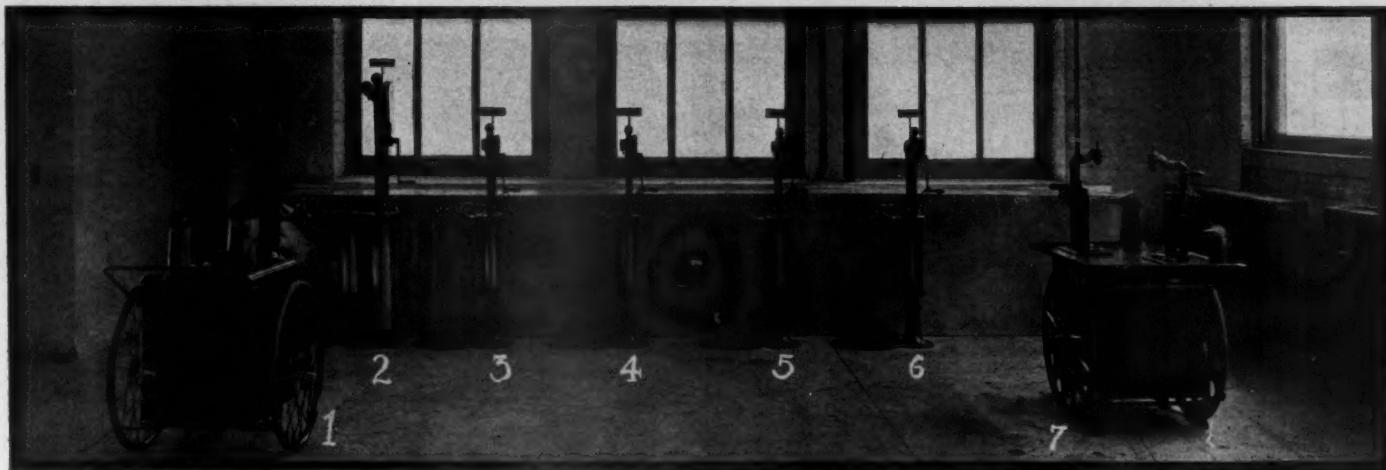


FIG. 14—COMPLETE OIL AND GASOLINE SCHEME IN REAR ON FIRST FLOOR

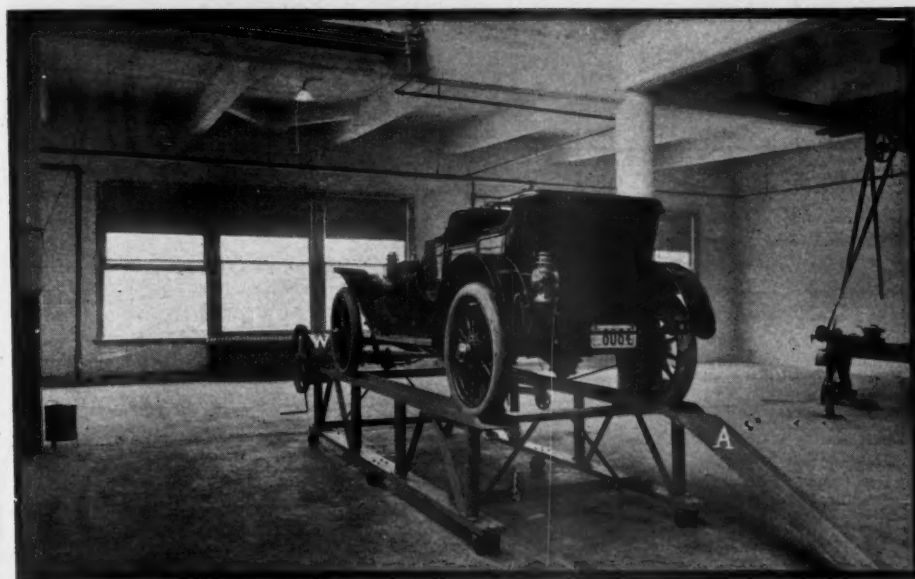


FIG. 15—AERIAL PIT IN REPAIR DEPARTMENT

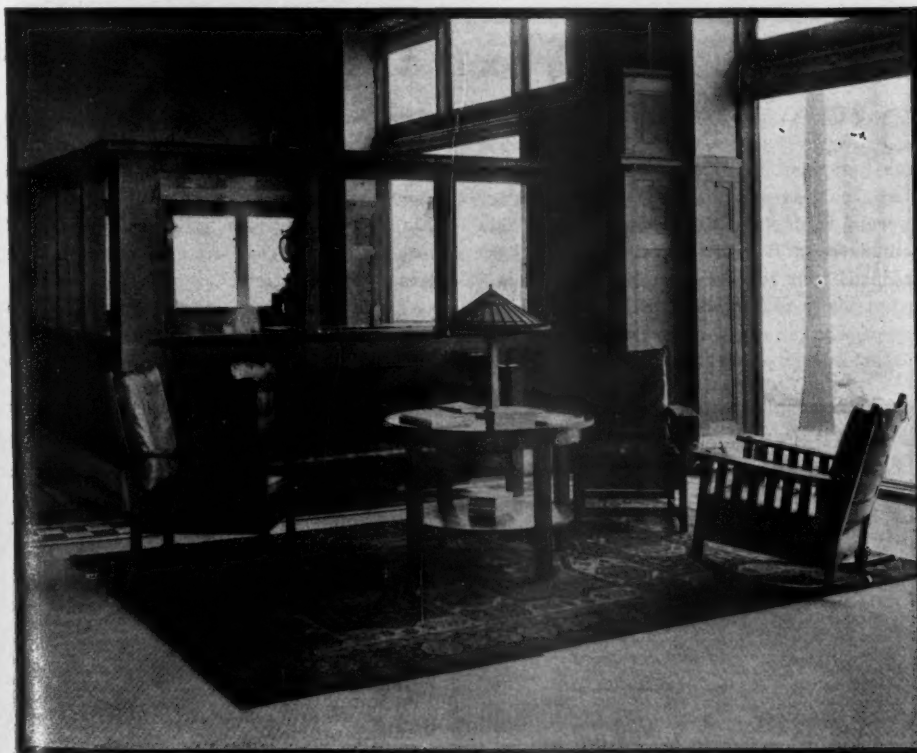


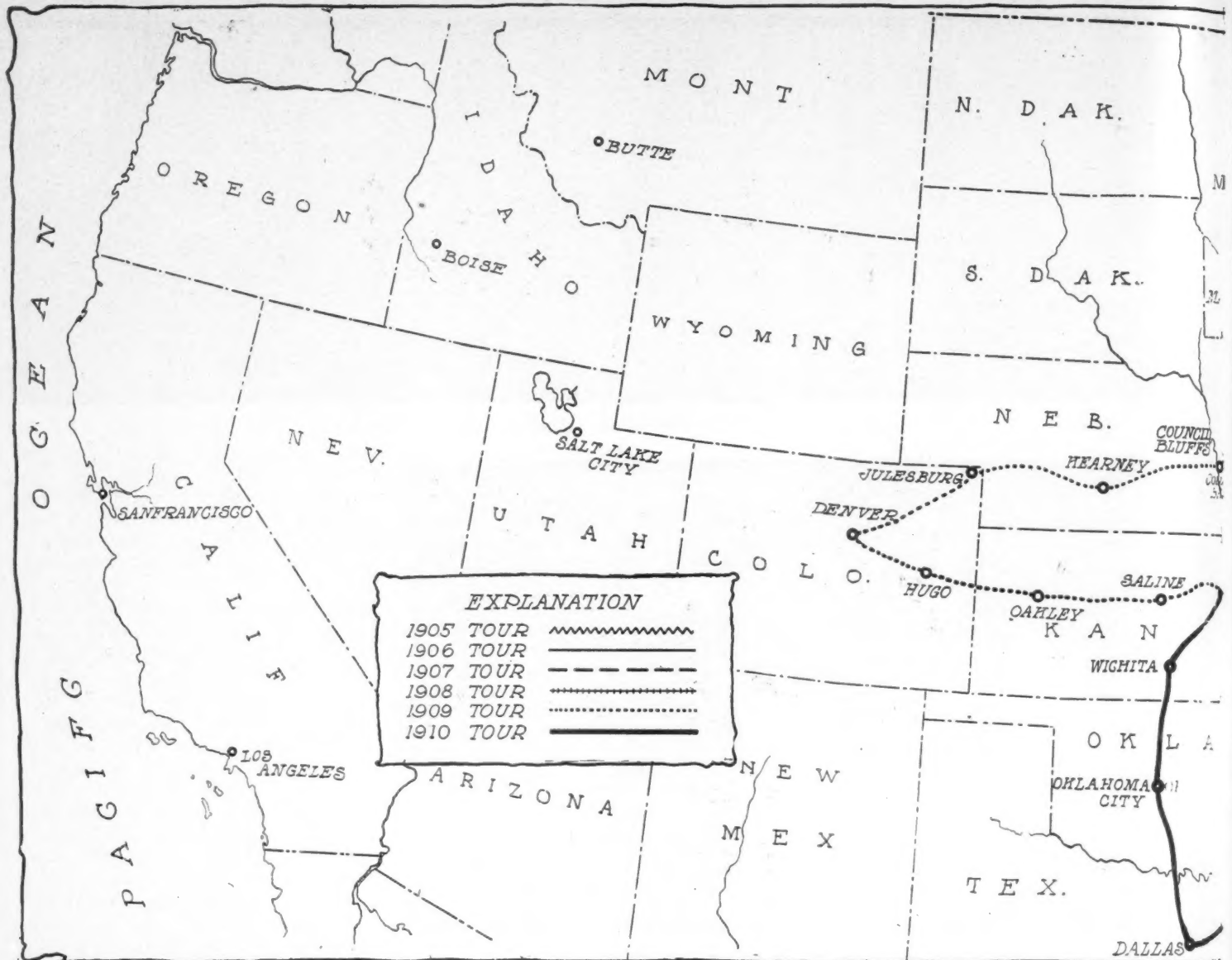
FIG. 16—MEN'S LOBBY IN CORNER OF SALESROOM

out; when the tool is returned, the check is passed back to the workman.

Next to the tool room and convenient to the toilet rooms is the workmen's dressing room, which is formed by a clever arrangement of individual steel lockers provided for their clothes. To complete the inspection, one cannot help but note the noiseless operation of the shafting and pulleys which operate the machine tools, all of which is of steel construction and runs on roller bearings. The generous distribution of waste-cans and cuspidors and the fire-extinguishers on every pillar are apparent; and attention is called to the almost invisible flush-cover sockets, at the bottom of each pillar, for the attachment of extension wires used in connection with electric lamps, drills, grinders and soldering-irons. Other features not to be ignored are a charging magnet for recharging magneto magnets from the general electric circuit, a full equipment for magneto repairs, and a compressed air outfit for cleaning up engines, etc.

Passing, now, through the partition into the rear portion of top floor, one reaches the department provided for owners or chauffeurs desiring to work on their own cars. This department is provided with two workbenches, with vises, compressed air for inflating tires, and a wash-rack. The blacksmith shop, which is fully equipped with a forge, an electric blower, two anvils, a quenching bath and a brazing outfit, also occupies one corner of the section, and another section is partitioned off for storage purposes.

It would be impossible in a short review of a comprehensive plant of this nature to devote anything like the space which it merits, it being only possible to touch the high spots and give the reader a general knowledge of the situation. A few general deductions will not be out of place at the present time. Foremost in this respect comes the absolute segregation of the sales and repair departments. Putting the repair department on the top floor permits of the complete selling force of new and second-hand cars carrying on its daily work without ever coming in contact with the repair department.



MAP OF THE UNITED STATES, SHOWING THE BROAD SCOPE OF THE TOURS FOR THE GLIDDEN TROPHY

## GLIDDEN TOUR ROUTES

- 1905**  
 New York  
 Hartford, Conn.  
 Boston, Mass.  
 Plymouth, N. H.  
 Bretton Woods, N. H.  
 Concord, N. H.  
 Worcester, Mass.  
 Lenox, Mass.  
 New York  
 Total, 870 miles
- 1906**  
 Buffalo  
 Utica, N. Y.  
 Saratoga, N. Y.  
 Elizabethtown, N. Y.  
 Lake Champlain, N. Y.  
 Montreal, Ont.  
 Quebec, Que.  
 Jackman, Me.  
 Rangeley, Me.  
 Total, 1,150 miles
- 1907**  
 Cleveland, O.  
 Toledo, O.  
 South Bend, Ind.  
 Chicago  
 South Bend, Ind.  
 Indianapolis, Ind.  
 Columbus, O.  
 Pittsburg, Pa.  
 Bedford Springs, Pa.  
 Baltimore, Md.  
 Philadelphia, Pa.  
 New York  
 Total, 1,570 miles
- 1908**  
 Buffalo  
 Cambridge Springs, N. Y.  
 Pittsburg, Pa.  
 Bedford Springs, Pa.  
 Harrisburg, Pa.  
 Philadelphia, Pa.  
 Milford, Pa.

## Details of Next Glidden Tour

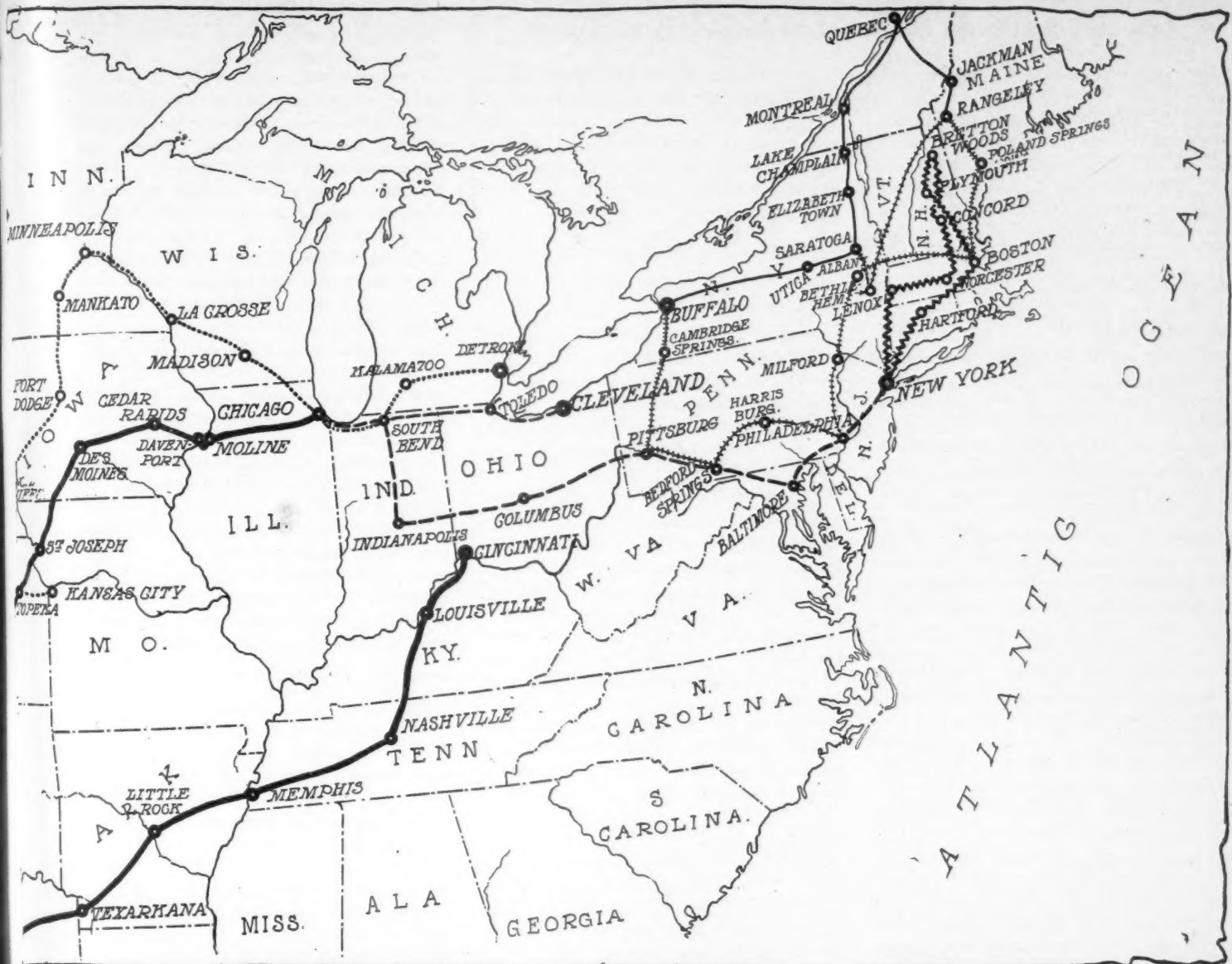
CHICAGO, Jan. 31—The contest board of the American Automobile Association will meet in Chicago during the show next week, at which time Chairman Butler expects to have a full attendance of his committee and when details of the 1910 national tour will be discussed and an attempt made to further work out the itinerary of what is expected to be the best road contest ever promoted by the A. A. A. A tentative route was announced week before last following a session of the board held in New York city on January 25, and while the trail was roughly blazed at that time, the committee still has plenty of work to do before it can officially announce its selection.

At the present time the board has in mind the issuing of certificates to be known as Glidden certificates, which will be given

## TABULATION SHOWING RECORDS OF VARIOUS MAKES OF CARS THAT

Car	Starts	Perfect scores	Car	Starts	Perfect scores
Pierce-Arrow	16	11	Knox	3	1
White	11	3	Columbia	3	1
Peerless	9	6	Pope-Toledo	2	1
Maxwell	9	1	Cadillac	2	1
Marmon	7	2	Darracq	2	1
Thomas	6	4	Stearns	2	1
Packard	6	2	American Mors	2	1
Reo	6	2	Rainier	2	1
Haynes	5	3	Gaeth	2	1
Oldsmobile	5	2	Oakland	2	1
Premier	5	2	Apperson	2	0
Pope-Hartford	4	1	Locomobile	2	0
Studebaker	3	2	Stoddard-Dayton	2	0
Franklin	3	2	Buick	2	0
Garford	3	1	Lozier	2	0





CONTESTS AND THE PROPOSED ROUTE FOR THIS YEAR'S TOUR, WHICH WILL INVADE NEW TERRITORY

## Will Be Discussed at Chicago

to those contestants which finish the tour with scores that are within a small percentage of being perfect, but it has not yet fixed the exact limits of such a percentage, and this will be one of the subjects discussed at the Chicago meeting.

Dates for the tour have been set for June 15-30, although it is possible that these may be changed if the exigencies of the occasion demand it. However it is thought

that the latter part of June will be the ideal time for holding a big contest and that it will be much better to shorten the tour a week instead of dragging it out as was last year's event. Since the announcement of the tentative route Chairman Butler has been in receipt of many letters from motorists living in the cities along the proposed route. While there is some doubt about the ability of the cars to get

### HAVE COMPETED IN FIVE GLIDDEN TROPHY CONTESTS OF THE A. A. A.

Car	Starts	Perfect scores	Car	Starts	Perfect scores
Cleveland	2	0	English Daimler	1	0
Corbin	2	0	Crawford	1	0
Chalmers	2	0	Harrison	1	0
Royal Tourist	2	0	Elmore	1	0
Aerocar	2	0	Shoemaker	1	0
Welch	1	1	Mitchell	1	0
Walter	1	1	Autocar	1	0
American Berliet	1	1	Pungs Finch	1	0
Pope-Tribune	1	0	Meteor	1	0
Rambler	1	0	Acme	1	0
Panhard	1	0	Pennsylvania	1	0
Napier	1	0	Selden	1	0
Decauville	1	0	Jewell	1	0
Stevens-Duryea	1	0	Glide	1	0
Clement	1	0	Midland	1	0

### GLIDDEN TOUR ROUTES

Albany, N. Y.  
Boston, Mass.  
Poland Springs, Me.  
Rangeley, Me.  
Bethlehem, N. Y.  
Saratoga, N. Y.  
Total, 1,670 miles  
1909

Detroit, Mich.  
Kalamazoo, Mich.  
Chicago  
Madison, Wis.  
La Crosse, Wis.  
Minneapolis, Minn.  
Mankato, Minn.  
Fort Dodge, Ia.  
Council Bluffs, Ia.  
Kearney, Neb.  
Julesburg, Colo.  
Denver, Colo.  
Hugo, Colo.  
Oakley, Kas.  
Saline, Kan.  
Kansas City, Mo.  
Total, 2,640 miles  
1910

Cincinnati, O.  
Louisville, Ky.  
Nashville, Tenn.  
Memphis, Tenn.  
Little Rock, Ark.  
Texarkana, Ark.  
Dallas, Tex.  
Oklahoma City, Okla.  
Wichita, Kan.  
Topeka, Kan.  
St. Joseph, Mo.  
Des Moines, Ia.  
Cedar Rapids, Ia.  
Davenport, Ia.  
Rock Island, Ill.  
Moline, Ill.  
Chicago  
Total, 2,200 miles, estimated

## TABULATION SHOWING ROADSTER PERFORMANCES IN GLIDDEN

Car	Starts	Perfect scores	Car	Starts	Perfect scores
Pierce-Arrow	5	3	Marion	1	0
White	5	2	Continental	1	0
Stoddard-Dayton	4	3	Gearless	1	0
Moline	4	0	Franklin	1	0
Overland	3	0	Blomstrom	1	0
Maxwell	1	0	Hupmobile	1	0
Premier	1	0	McIntyre	1	0
Chalmers	1	0	Jewell	1	0
Dragon	1	0	Mason	1	0
Brush	1	0	Lexington	1	0
Matheson	1	0			

through the Mississippi bottom lands so early in the year as June, it is thought that in the main the route will follow the plan laid out—from Cincinnati, through Louisville, Ky., Nashville and Memphis, Tenn., Little Rock and Texarkana, Ark., Dallas, Texas, Oklahoma City, Okla., Wichita and Topeka, Kans., St. Joseph, Mo., Des Moines, Cedar Rapids and Davenport, Ia., Rock Island and Moline, Ill., and thence to Chicago.

While the board has not as yet touched upon other phases of the tour outside of the decision to retain the Glidden trophy as the chief prize it is more than probable that there will be separate class for roadsters just the same as it has been since 1906. The growing popularity of this type of car makes a separate class a necessity, and of late years it has been demonstrated that the roadsters are giving the touring cars a hard run for public favor, for in the 1909 tour there were as many two and three-passenger machines competing as there were touring cars. It is not known whether or not the third division, the one for toy tonneaux, will be retained, for last year, in spite of the fact that the city of Detroit put up a magnificent trophy, it attracted only three entries.

#### Gladd Cup Is Retained

The retention of the Glidden trophy as the chief prize of the annual tour meets with the approbation of nearly everyone, for there is no other motoring trophy in the world that has such historic memories as has the Glidden except the Vanderbilt.

The Glidden has been run for five times now, and a review of its history shows that 164 cars have contested for the big mug which was donated by the Boston banker following the famous New York-St. Louis tour in 1904. Of these 164 cars, fifty-six of them made perfect scores, a percentage of 34.15, which is a remarkable performance considering the fact that these 164 cars travelled a distance of 7,900 miles over all kinds of roads and under all kinds of conditions. Of course perfect scores were easier to make in the early days of the contest, because of the fact that no observers were carried, and the chief requisites were that cars run on schedule time. Nowadays, however, conditions are more severe, each car carrying an observer, and in addition to making the controls on time there is a technical examination at the end of the tour which weeds out those cars which are not mechanically perfect. Had it not been for this

technical examination the percentage of Glidden perfect scores would have been increased, for while the records show that Winchester's Pierce-Arrow was the only one to escape penalization, there were five in all in the Glidden division that travelled from Detroit to Kansas City by way of Chicago, Minneapolis and Denver that had perfect road scores—two Premiers, a Marmon and two Pierce-Arrows.

A review of Glidden history at this time is not inopportune and is decidedly interesting. It shows the idea of such a contest originated as the result of the tour from New York city to the Louisiana Purchase Exhibition at St. Louis, and which followed the main road leading through Albany, Utica, Syracuse, Rochester, Buffalo, Erie, Cleveland, Toledo, South Bend, Springfield, Ill., and St. Louis. While only sixteen started from New York, still the main caravan picked up other parties on the way until there were 108 machines all told that rolled into St. Louis early in August. Following this came Mr. Glidden's offer to donate a trophy to decide the touring supremacy of the country, and in 1905 the first run for the cup was held, the route being from New York to Bretton Woods, N. H., and back to New York, a distance of 870 miles. In 1906 the tourists started from Buffalo and went to Rangeley, Me., passing through Canada on the way and covering a distance of 1,150 miles. In 1907 they started from Cleveland, came to Chicago and finished in New York, a distance of 1,570 miles. In 1908 Buffalo again got the start, and after going to Boston, Mass., the tourists finished at Saratoga, N. Y., total 1,620 miles. In 1909 the tour covered 2,640 miles and went from Detroit to Kansas City, Mo., by way of Chicago, Minneapolis and Denver.

The 164 different cars that have competed for the Glidden trophy represent sixty different makes, of which six are of foreign construction. The Pierce-Arrow is the only one which has competed in all five tours and the records show that of the sixteen cars of this make that have made the fight for the trophy, eleven of them have made perfect scores. The Pierce was the first winner of the cup, making one perfect score in 1905 with its one car. In 1906 it made three perfect scores with three chances; in 1907 it had three out of five; in 1908 it had three out of three, and in 1909 one out of two.

Next to the Pierce-Arrow the White,

Thomas, Reo and Peerless can claim veteran honors, having participated in four out of the five tours. The White has started eleven cars out of which number it secured three perfect scores. After running in the first three contests the steamer remained out of the 1908 event, but last year it put in one car, a steamer burning kerosene for fuel. The Thomas was not a contestant in the first tour, but has been represented since 1906, there having been six cars of this make in the four events, four of which have gone through with perfect scores. The Peerless has started nine cars and won six perfect scores. It was one of the sixteen different makes that participated in the 1905 event, and ran continuously up to last year, when its makers refused to enter because of their dissatisfaction over the ruling made by Chairman Hower the year before over the question of penalizing Maguire's Pierce-Arrow. The Reo was in the Glidden division every year until last year and won two perfect scores in six chances. The Maxwell, Haynes and Oldsmobile have been in three of the five tours, the Haynes making three perfect scores with five cars.

#### Roadsters are Recognized

The idea of the separate division for roadsters first was conceived in 1906 when Paul Deming, then chairman of the A. A. A. touring board, put up a trophy for this class. It attracted five contestants, of which four were Whites and one a Maxwell. It resulted in the Maxwell and Augustus Post's White making perfect scores, but because of the fact that Mr. Post had blazed the trail for the tour that year, which had given him a slight advantage when there was some confusion over the exact route, Mr. Post gracefully withdrew, giving the trophy to C. W. Kelsey, who drove the Maxwell. In 1907, 1908 and 1909, Frank B. Hower hung up the roadster prize. In 1907 there was another tie, in which Hal Sheridan in the White and E. S. Smith in the Stoddard-Dayton were involved, they being the only one perfect out of the eleven cars that competed. A runoff of the tie returned the White the winner. Fourteen roadsters competed in 1908, and two Pierce-Arrows, two Stoddard-Daytons and a Premier tied and in the runoff the honors went to Charles Clifton's Pierce-Arrow. In 1909 fourteen roadsters again started and J. S. Williams' Pierce-Arrow was the only one to be awarded perfect score by the contest board.

In these four battles for roadster honors, forty-two cars representing twenty-three different makes have contested. The Pierce-Arrow, as has been the case in the Glidden, has been best represented, having started five cars and made three perfect scores, twice winning first place. The White also started five, made two perfect scores and won the cup once. With four cars, the Stoddard-Dayton has made three perfect scores, and twice has been tied for first place.



## NEW CONTEST SLATE ANNOUNCED BY A. A. A.

NEW YORK, Jan. 31—Official announcement has been made by S. M. Butler, chairman of the contest board of the American Automobile Association, of the list of proposed contests for 1910, with approximate dates from which the contest board will make up its official schedule. This list shows that if the promoters throughout the country carry out their 1910 plans, there will be fifteen road races, twenty-two reliability runs, fifteen hill-climbs and forty-five track meets. It, however, is possible and more than likely that others will be added to this list, this announcement being the preliminary gun of the 1910 campaign.

Of the fifteen road races scheduled all but one are renewals of previous contests, the recruit being the Grand Rapids Automobile Club, of Grand Rapids, Mich., which desires to run its road race some time in July, no exact date being set. The Vanderbilt this year will be run earlier than usual, an application having been made for October 1. Savannah has announced its intention to get into the game again, but has set no time. It is thought that the Georgians desire to renew the American grand prize race which proved a feature of 1908, and which was international in character. Labor Day has been asked for by Lowell, Mass., where the national stock chassis race was run last year. Denver has asked for two dates, Decoration Day and Labor Day, while the road carnival at Riverhead, L. I., will be renewed but at an earlier time of the year as was the case in 1909, promoters filing a claim for June 1. The Chicago Automobile Club has been given June 25 for the Cobe cup race despite the fact at the present time it is seriously contemplating putting up the trophy for a speedway event. The Quaker City Motor Club will run its third annual road race at Fairmount park, Philadelphia, on October 8, it being one of the first clubs to announce its intentions.

### Pacific Coast Well Represented

The Pacific coast proves to be the strongest supporter of road racing of any section in the country. Six dates have been awarded, the first one being May 9, when the Santa Rosa event will be contested. The Portland Automobile Club, of Portland, Ore., will hold its rose carnival June 11, in which the Wemme cup will be the chief consideration. The Licensed Motor Car Dealers' Association, a new organization in Los Angeles, will hold the Santa Monica road race this year, having been given a choice date, July 4. The annual 100-mile race up Mount Baldy will be contested September 10, while on October 23 the Automobile Club of California will promote the Portola road meet across the bay. The desert road race from Los Angeles to Phoenix, which will be promoted by the Maricopa Automobile Club, will start November 24.

Chief of interest in the reliability run schedule is the fact that the Glidden tour will be held June 15-30. The postponed flag-to-flag run from Denver to Mexico for the Wahlgreen trophy will start May 1. The New York-Seattle transcontinental run is booked for starting July 4, while the Munsey tour will begin August 15. The Chicago Motor Club has been given October 15 for its 1,000-mile test.

Nearly all the hill-climb classics have

been continued, Wilkes-Barre having asked for June 11 for its Giant's Despair contest, despite the fact that there were rumors that this event was to be abandoned. Of equal importance will be the Chicago Motor Club event at Algonquin, which will take place in August. The first climb of the year will be at Atlanta on Washington's birthday, when the Atlanta Journal will promote the event, which last year was really sensational.

### OFFICIAL CONTEST SCHEDULE FOR NEW SEASON

#### ROAD RACES

Denver, Denver Motor Club, May 30.  
Riverhead, Motor Contest Association, June 1.  
Cobe, Chicago Automobile Club, June 25.  
Grand Rapids, Grand Rapids Automobile Club, middle July.  
Denver, Denver Motor Club, September 5.  
Lowell, Lowell Automobile Club, September 5.  
Vanderbilt, Motor Cups Holding Co., October 1.  
Fairmount Park, Quaker City Motor Club, October 8.  
Savannah, Savannah Automobile Club, —

#### HILL CLIMBS

Atlanta, Atlanta Journal, February 22.  
Kansas City, Automobile Club of Kansas City, April.  
Bridgeport, Automobile Club of Bridgeport, May 30.  
Wilkes-Barre, Wilkes-Barre Automobile Club, June 11.  
Worcester, Worcester Automobile Club, June 4.  
Cleveland, Cleveland Automobile Club, June 15.  
Ossining, Upper Westchester Automobile Club, June 18.  
Plainfield, Plainfield Automobile Club, July 11.  
Richfield, Richfield Springs Automobile Club, middle July.  
Algonquin-Chicago, Chicago Motor Club, middle August.  
Denver, Denver Motor Club, November.  
Minneapolis, Minneapolis Auto Club, —  
St. Paul, Auto Club of St. Paul, —

#### RELIABILITY CONTESTS

Philadelphia, Century Motor Club, —  
Philadelphia, Quaker City Motor Club, April 15.  
Denver to Mexico, flag to flag run, G. A. Wahlgreen, May 1.  
Hartford, Conn., Automobile Club of Hartford, May 1.  
Harrisburg, Pa., Motor Club of Harrisburg, May 2 to 7.  
Norristown, Pa., Norristown Automobile Club, May 18.  
Fort Worth, Tex., Fort Worth Star-Telegram, May 22.  
Detroit, Detroit Auto Dealers' Association, May 25.  
National Glidden tour, A. A. A., June 15-30.  
Denver, Denver Motor Club, June.  
New York to Seattle, M. R. Guggenheim, July 4.  
Philadelphia to Wildwood, North Wildwood Automobile Club, July 2.  
Minneapolis-Tribune, Minneapolis Automobile Club, August 1.  
Munsey tour, Frank A. Munsey Co., August 15.  
Minneapolis, Minnesota State Automobile Association, August 31.  
Philadelphia to Wildwood, North Wildwood Automobile Club, September 3.  
Cleveland, Cleveland Auto Club, September.  
Kansas City, Automobile Club of Kansas City, September.  
Louisville, Louisville Automobile Club, October 8.  
Chicago, Chicago Motor Club, October 15.  
Denver, Denver Motor Club, October.  
Worcester, Worcester Automobile Club, October.

#### TRACK RACES

New Orleans, New Orleans Automobile Club, February 5 and 6.  
Montgomery, Ala., Automobile Association, February 12 or April 20.  
Birmingham, Ala., Birmingham Police Relief Association, April 27.  
Atlanta, Atlanta Automobile Association, May 5, 6 and 7.  
Indianapolis Motor Speedway, May 29, 30 and 31.  
Boston, Bay State Automobile Association, May 30.  
Brighton Beach, Motor Racing Association, May 30.  
Philadelphia, Quaker City Motor Club, June 4.  
Columbus, Columbus Automobile Club, June 14.  
Indianapolis Motor Speedway, July 1, 2 and 4.  
Dallas, Tex., Dallas Automobile Club, July 4th.  
Cheyenne, Wyo., Motor Club, July 4.  
St. Paul, Minn., State Automobile Association, July 4.  
Wildwood, N. J., Motor Club of Wildwood, July 4.  
Wildwood, N. J., North Wildwood Automobile Club, July 4.  
Wildwood, N. J., North Wildwood Automobile Club, August 6.  
Cheyenne, Wyo., Motor Club, August 17.  
Cheyenne, Wyo., Motor Club, September 5.  
Wildwood, N. J., Motor Club of Wildwood, September 5.  
Wildwood, N. J., North Wildwood Automobile Club, September 5.  
Galveston, Galveston Cotton Carnival, July.  
Kansas City, Automobile Club of Kansas City, July 23.  
Philadelphia, Quaker City Motor Club, August 6.  
Indianapolis Motor Speedway, August 12 and 13.  
Indianapolis Motor Speedway, September 2, 3 and 5.  
Minneapolis State Fair, Automobile Clubs of Minneapolis and St. Paul, September 5 and 10.  
Providence, Rhode Island Automobile Club, September 9 and 10.  
Indianapolis Motor Speedway, October 7 and 8.  
Dallas, Dallas Automobile Club, October 25.  
Atlanta, Atlanta Automobile Association, November 15.  
New Orleans, New Orleans Automobile Club, November 5 and 6.  
San Antonio, San Antonio Automobile Club, November 6, 9 and 13.

#### PACIFIC COAST Road Races

Santa Rosa, May 9.  
Portland Rose Carnival, Portland Automobile Club, June 11.  
Santa Monica, Licensed Motor Car Dealers' Association of Los Angeles, July 4.  
Mount Baldy, September 10.  
San Francisco-Portola, Automobile Club of California, October 23.  
Los Angeles-Phoenix, Maricopa Automobile Club, November 24.

#### Hill Climbs

Altadena Licensed Motor Car Dealers' Association, Los Angeles, February 22.  
Mile-high hill-climb, Redlands Mile-High Hill-Climb Association, November 24.

#### Track Races

Los Angeles Motor Racing Association, January 9.  
Los Angeles Motor Racing Association, February 12, 13.  
Los Angeles Motor Racing Association, March 12, 13.  
Los Angeles Motordrome Co., April 8, 9, 10.  
Los Angeles Motordrome Co., April 13.  
Los Angeles Motordrome Co., April 15, 16, 17.  
Los Angeles Motordrome Co., 24-hour, April 30, May 1.  
Santa Rosa, Santa Rosa Automobile Association, May 15, 16.  
Los Angeles Motordrome Co., May 29, 30, 31.  
Los Angeles Motordrome Co., July 2, 3, 4.  
Los Angeles Motordrome Co., Labor day.  
Seattle, M. R. Guggenheim, September 10, 11 and 12.  
Spokane, Spokane Interstate fair, —

# UNITED STATES MOTOR CO. IS THE LATEST

**Incorporation of a \$16,000,000 Holding Organization Is Announced, With Maxwell-Briscoe Identified With Proposition—Desires Line of Cars Ranging From \$500 to \$5000**

NEW YORK, Jan. 27—Announcement was made yesterday of the incorporation of the United States Motor Co. with an authorized capital of \$16,000,000, half common and half preferred. According to present plans the new company is to acquire several of the prominent manufacturing concerns of motor cars and parts and to conduct the making and selling on a broad scale. A large part of the preferred stock has been underwritten, so the new company will begin with ample cash working capital.

It is stated that plans have already been perfected by the United States Motor Co. for the acquiring of the Maxwell-Briscoe Motor Co. and that the same interests heretofore identified with that successful concern are to be identified also with the new company. It also is stated that J. D. Maxwell, Benjamin Briscoe and others who have been active in the management of the Maxwell-Briscoe Motor Co. and are responsible for its present position in the motor car trade, will be prominent in the manufacturing, the policy and the financial management of the new corporation.

It is to be the general policy of the company to acquire only those concerns and facilities by and through which it will be enabled to produce a complete line of motor cars, ranging in price from \$500 to \$5,000, enabling it to administer the business affairs of the constituent companies under a single management and to market the product under a general sales organization of the greatest efficiency.

## Motives of Big Corporation

It is stated that the main idea and the principal motives leading up to the organization of the United States Motor Co. were to so equip the company's engineering, manufacturing, financial, administrative and selling departments as to make possible a production and distribution of the best quality of product that could be produced for the price. A strict adherence to this policy will be the mainspring of every action of the company. J. D. Maxwell, Benjamin Briscoe and others now prominent in the Maxwell-Briscoe Motor Co.'s organization will be associated with the new company, as also will be a number of others now associated with other companies soon to be acquired.

Mr. Briscoe, when asked for more definite information as to the general policies of the United States Motor Co., had this to say:

"I will say, first of all, that neither Mr. Maxwell nor I have relinquished in any way our responsibilities in connection with the Maxwell-Briscoe Motor Co. Our duties toward the company and our belief

in its splendid future have in no way been supplanted.

"The purpose and the scope of the United States Motor Co. will become evident as its business is developed. It is impossible for me to touch on more than a few of its objects at this time. I desire particularly, however, to relieve the minds of those who may be interested, from any possible suspicion that there lurks anywhere in the United States Motor Co. a sinister intention toward any of our competitors or the trade in general.

"The United States Motor Co. will engage actively in the motor car business. This business has assumed large proportions in an incredibly short time and is exercising a powerful effect upon the industrial and social conditions of this country. Its growth has naturally been attended with many defects in methods, and there is no doubt that both manufacturing and distributing methods call for reform.

"The swarm of new promotions based on ignorant hope, and doomed for the greater part to disaster, will make matters still more complicated in the future. Without arrogating to itself the function of censor to the industry, the United States Motor Co. will throw the weight of its influence for such improvements as will become of benefit to the public and itself and also to the interests of other legitimate manufacturers. The troublesome patent situation which bids fair to involve great burdens on the industry, unless something is done to prevent it, is a field in which the company will be able to work to the benefit of all properly concerned.

"The United States Motor Co. has no intention or desire to strive for the creation of a monopoly, nor to secure by any artificial means the control of any branch of the trade. It will not interfere with or try to injure the business of any manufacturer of motor cars or of any distributor. It expects to earn every dollar it makes and will ask only for such rewards as are due it by virtue of its efficient organization and excellent service to the public."

## Big Week in Detroit

Detroit, Mich., Feb. 1—The week of January 24 should go down into motor history in Detroit as one of the most important in the momentous succession of events which have combined to make the

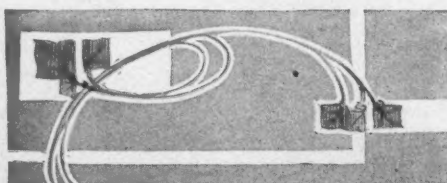
manufacture of motor cars the leading industry of the city and the city itself the seat of one of the world's greatest manufacturing activities. While the week was featured by the annual show of the Detroit Automobile Retailers' Association—and this really was the center—announcements of importance much farther reaching were of almost daily occurrence.

Pre-eminent among these were the announcement of three immense factories to be constructed in Detroit, with excellent prospects of a fourth. Following the reorganization of the Lozier Motor Co., announced a week ago, coupled with the intention of the firm to build a million-dollar factory and move the seat of the enterprise to Detroit, came announcements of a similar character from the Hudson Motor Car Co. and the Van Dyke Motor Car Co., each of which has secured real estate for the construction of large factory facilities. Before the sensation following these announcements had died away came the news of the formation of the new United States Motor Co. and a visit to Detroit by Benjamin Briscoe, prominent as the organizer of the group, during which he admitted the strong possibility of a Detroit parts factory which should supply the separate members of which the Maxwell-Briscoe plants will form the nucleus.

## Hudson Buys Big Tract

The Hudson Motor Car Co., which is yet to pass its first birthday, has scored so pronounced a success with its 1910 models as to call for a speedy addition to its manufacturing facilities. Up to date the firm has been housed in the old Aerocar plant on Mack avenue. The new factory will be located in Fairview, on property adjacent to that of the Chalmers Motor Car Co., with which the Hudson has maintained close relations ever since its inception, though the two boards of directors are now entirely separate. Together with the Gray estate, the directors of the Hudson company have secured nearly ½ mile of frontage on Jefferson avenue, running back to the river. The present intention is for the Hudson company to start building operations on the front end of the property, the rear portion being turned over to a motor boat building concern. President Roy Chapin of the Hudson is authority for the statement that, while nothing definite is contemplated along that line at present, his firm has in view, when the proper time comes, the construction of an aeroplane factory, ideal facilities for which are presented by the tract and its neighborhood to the river and Lake St. Clair.

The Hudson people plan an investment of more than \$500,000 for the property and real estate combined. The first construction will be the lengthening of the spur track which now connects the Chalmers plant with the Belt Line railroad, through the Chalmers tract to the site of





## ACTIVITY IN DETROIT'S TRADE CIRCLES

the new Hudson factory. The tract purchased commanded a price of \$2,200 an acre and is comprised of 22 acres. At present a large portion of it is low ground and considerable filling will be required. The factory will be of concrete construction.

### Van Dyke's Big Plans

The new factory of the Van Dyke Motor Car Co. will be built at the opposite extremity of the city, at Junction and Leverette avenues, a portion of Detroit now occupied by but one motor car factory—the Flanders plant of the E-M-F. Though a large percent of the skilled machinists of the city reside in this portion of town, most of them are now compelled to ride to the northeast part of the city to their work. The Van Dyke is a new concern, and but recently started production. It is limiting its activities to the manufacture of one model of light delivery wagon, designed to appeal to laundries, groceries and other retail concerns. One thousand cars will be manufactured this year. The Van Dyke is backed up by plenty of capital and has secured the services of George A. Troutt as its factory manager. The company plans to establish garages in all the large centers of the country at which it will guarantee to care for and equip cars nightly for the sum of \$30 per month, oil and gasoline included. It is pointed out that this plan will relieve the average merchant of the necessity for securing a skilled mechanic to run each of his cars. An elaborate form of checking has been prepared under the management of President Frank G. Van Dyke.

Among those back of the Van Dyke are S. P. Clarke, general manager of the Northern Elevator of Canada, H. P. Coquilland of South Bend, V. H. Moore, formerly of the Packard Motor Car Co., and R. E. Dillon of the Scotten-Dillon Tobacco Co., one of the largest of Detroit's non-motor car manufacturing concerns. Ground will be broken for the new factory Feb. 15.

The announcement of the incorporation of the new United States Motor Co. was followed by the immediate appearance in Detroit of Benjamin Briscoe, president of the Maxwell-Briscoe company, who is credited locally with being the leading organizer of the \$16,000,000 corporation. Mr. Briscoe spent a few hours at the show and then established headquarters at the office of the firm's down-town branch, where a series of conferences took place.

The Maxwell-Briscoe is now the possessor of a fine factory site in the northern part of the city near the plant now occupied by the Brush Runabout Co., of which Mr. Briscoe's brother, Frank Briscoe, is the head. Rumor naturally credited the United States Motor Co. with the probable acquisition of the Brush plant and the establishment of a parts factory in Detroit on a plan similar to that which will be built this summer by the General

### Hudson, Van Dyke and Lozier Announce They Will Build Immense Factories—Benjamin Briscoe Talks of the Plans of United States Motor Co.—Support Promised Summer Show.

Motors. Intentions of this sort were neither affirmed nor denied by Mr. Briscoe, who stated, however, that as yet the United Motors had absorbed but one corporation—the Maxwell-Briscoe. He denied that negotiations were on at present for the purchase of any Detroit factory other than the Brush and stated that the parts factory would be a development of the future and was not included in the immediate scheme of the general idea which was being carried out.

### Benjamin Briscoe Talks

"The purchase of the United Motors is one of economy," said Mr. Briscoe to Motor Age. "It is true that we are engaged in the process of securing factories which can supplement the Maxwell-Briscoe line of cars of grade that will enable us to provide dealers with a line ranging from the lightest runabout to the highest powered pleasure vehicle. The plan contemplates the installation of a chain of agencies in every city and trade center of the United States and the manufacture of parts in a centralized manner which will enable the members of the group to standardize their product to the absolute limit."

Had Mr. Briscoe authorized the formal announcement that the United States Motors would instantly start the construction of a \$3,000,000 factory in Detroit, however, it would have created no more than a passing mention. Detroiters have become positively blasé of late, in their attitude toward motor manufacturing. During the show the Manufacturers Bureau, an organization sustained for the purpose of enlisting labor in new local enterprises and in bringing outside labor to Detroit, announced that the motor manufacturing concerns of Detroit have brought to the city in the neighborhood of 19,000 laborers from other points of the country. These figures, combined with the statistics of the new Detroit directory, give the city a population of well over a half-million, nearly one-third of whom have been added since the birth of the motoring industry.

It was in such an atmosphere as this that the committee of Detroit manufacturers spent the week, canvassing the trade for the purpose of securing the assistance in the movement to bring the Detroit and Michigan makers together on the question of a summer show at the state

fair grounds. William E. Metzger and Frank Briscoe were the active boosters for this enterprise and found virtually uniform success. During the week W. C. Durant of General Motors, Benjamin Briscoe of United States Motors, Harry Lozier of the Lozier and virtually all the prominent Detroit makers went on record as in favor of the show and the event now seems assured.

A delegation from Detroit is likely to visit the Chicago show and continue the canvass. The movement was really inaugurated by the Detroit Automobile Retailers' Association, which has taken the lead in the matter and has been booming it for a year, and the Detroit retailers will also be represented among the boomers, if this plan of promotion is decided on.

Details of the movement will be discussed further at a banquet Wednesday evening at which manufacturers and press will be guests of the D. A. D. A., and Mayor Breitmeyer will represent the city. This event will also form the annual celebration which, according to prior precedent, has accompanied the closing of the show. The effort toward a national Detroit exhibition is the occasion of the postponement, the period accompanying the show activity not being deemed the most propitious for the furthering of such a project.

### Detroit Show a Success

The Detroit show closed Saturday evening in a pandemonium of horn-toting and general jubilation. It was by all odds the most successful exhibition of its kind ever held locally. The attendance came very close to the 50,000-mark and the educational value of the affair far surpassed any of the prior Detroit exhibitions. An estimate of the cars sold places the valuation at approximately \$1,000,000, of which state dealers took a considerable majority. The most pleasing feature to the student of motoring conditions was the demand for the heavier and more expensive cars which were on exhibition. Many of the state agents who have formerly handled only the lighter grades, have added one or two of the more powerful cars to their lines. The largest single sale was by the E-M-F, which contracted with one dealer for a total of cars aggregating \$35,000 in value. The Cartercar was a close second with a \$30,000 order from the Kellogg Toasted Corn Flakes Co., of Battle Creek, which signed a contract for twenty-four cars of the touring-car model, equipped with special bodies, designed for advertising purposes. There was considerable competition for this order and the Cartercar people felt commendable pride in booking it. One other order of a similar character



for another concern, was announced during the show, demonstrating that the town-to-town plan of advertising by means of motor cars is a new variety in which manufacturers may dispose of their product when the time comes for the cultivation of special lines of stimulation.

The local trade was far in advance of anything in past seasons but was, as usual, largely of the prospective order. Veteran dealers agreed that the number of prospective purchasers was far in excess of anything in past years. The early show is a proven success in Detroit, for it will fill in the remaining weeks of the winter in a most acceptable fashion for the local dealers, all of whom have a list of men who are in the market for a car. The week provided excellent conditions for demonstrating, however, and many local sales were pushed to completion before the show was over. Undoubtedly, had the crowds been smaller or distributed over a larger area, more retail business could have been consummated.

A special feature of the week was a banquet on Thursday, tendered E. Leroy Pelletier, former show manager whose genius it was that made the first D. A. D. A. show a success and who followed that by laying out the general scheme of the exhibition of last year, the details of which were generally adhered to in the affairs which has just concluded. The organization took that form of recognizing Mr. Pelletier's assistance and in assuring him that he was remembered, in spite of the fact that business duties prevented his again standing at the helm.

During the week it was announced that the Chalmers company had changed its name from the Chalmers-Detroit Motor Car Co. to the Chalmers Motor Car Co., because so many cars are using the Detroit end of the name.

## Attractive Show Held at Oakland

OAKLAND, CAL., Jan. 25.—The steady growth of this city as a motor car distributing point was again demonstrated during last week, when, under the auspices of the Alameda County Automobile Association, one of the most attractive and successful motor car shows ever held on the coast drew thousands of visitors and many sales were reported as booked by the exhibitors. It was Oakland's first motor car show and so encouraging was the outcome of the exhibition that hardly had the closing time of Sunday night been reached before the promoters were planning to hold a second display toward the close of this year or early in 1911. The same enthusiasm that prevailed when Alameda pulled off the big Portola road race last October was displayed at the show and the general slogan was heard on all sides: "Make Oakland a factor in the state's motor car business."

The exhibition was held at Piedmont pavilion, a large, roomy structure that lent itself admirably to show purposes. Forty-seven different makes of cars, embracing more than 100 different models, were placed on display by the twenty-eight agencies and companies from Oakland and San Francisco. The opening of the show followed one of the longest motor car parades on record in Alameda county. City Attorney John W. Stetson, speaking for Mayor Mott, made the opening address and laid stress upon the marked strides Oakland has made within the last 2 years in the motor car industry. He was followed by I. H. Clay, president of the chamber of commerce, who dwelt on the great possibilities before the city.

The largest exhibit was made by the H. O. Harrison Co. of San Francisco, Cali-

fornia agent for the Peerless and Selden cars. The arrangement of the firm's display was most artistic and the five models of 1910 Peerless cars, which included a limousine, roadster, close-coupled body, landaulet and polished chassis, had a crowd of interested spectators constantly around them.

The Studebaker Brothers Co. had one of the largest exhibits, in which it displayed its line of gasoline and electric cars to advantage. This booth, too, was one of the centers of interest, the electric vehicles creating marked interest among the women visitors.

Most of the exhibitors made a specialty of showing the close-coupled type of cars and the display of the White company was no exception. Manager C. A. Hawkins of this company put on display a full line of both steam and gasoline machines, which included a good percentage of the close-coupled type, together with limousines and roadsters.

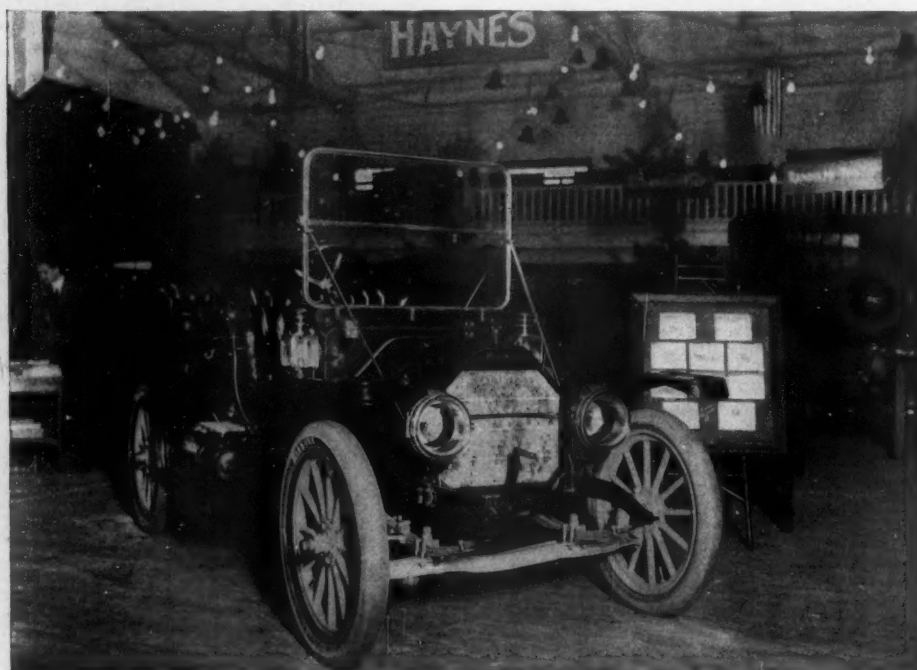
Like at the Studebaker booth, the Babcock electrics, which formed part of the Pioneer Automobile Co.'s exhibit, attracted a good deal of attention and similar conditions existed at the display of the Woods electric, entered by the Pacific Motor Car Co. The electric car is finding more favor in this section of the state of late and the dealers who have been pioneering this end of the business are beginning to think that they are near the goal of success for which they have strived for some time. Aside from the electrics, the Pioneer company's booth included models of the Thomas, Chalmers-Detroit, Hudson and the Randolph truck.

The new friction-drive Carterear exhibit was constantly surrounded by a crowd of curious spectators, who were anxious to have explained the workings of this unusual motor. A. G. Davis, who was recently appointed Oakland agent for this car, was most indulgent and never tired answering the many questions put to him. The exhibit included a runabout, a close-coupled body, light five-passenger touring car and a polished chassis.

I. J. Morse, coast manager of the Locomobile Co. of America, displayed several of the new models from the San Francisco branch and made one of the most attractive showings in the exhibit.

Altogether more cars were on display than at the show held in San Francisco during Portola week, at which time many of the new models were not available. The local pavilion, too, was more suitably adapted to display purposes than was the room in which the Portola exhibit was held.

Oakland is proud of its showing and its agents have started the year with a determination to make the business one of the biggest in the commercial life of the large city of San Francisco.



OAKLAND SHOW—THE EXHIBIT OF THE HAYNES



## President Taft at Motor Show

WASHINGTON, D. C., Jan. 30.—The Washington dealers' show, which closed last night in a blaze of glory, had the distinction of being the first motor car show that was ever attended by a president of the United States. President Taft visited the show yesterday afternoon and spent nearly half an hour inspecting the 113 cars on exhibition. Accompanied by his military aide, Captain Archibald Butt, and several secret service men, he arrived at Convention hall in his White steamer at 5:30 o'clock. As his visit had been unheralded there scarcely were fifty people in the big hall when he arrived. Chairman Long, of the show committee, and Manager Johnson were hurriedly notified of his presence, and greeted him as he entered. Accompanied by them and by W. C. Sterling, of the New York branch of the White Co., and J. M. Stoddard, of the Cook & Stoddard Co., of this city, the president leisurely made the round of the hall and manifested keen interest in the various cars. He was particularly interested in the Pierce-Arrow and White chassis, as both of these makes of cars are in the White House garage, and he plied his guides with questions about the mechanical features. He commented on the great strides the motor industry has made in the last few years, and looking up at the aeroplane exhibits, he jokingly remarked: "Those are the things that will soon put you fellows out of business."

Before leaving the hall President Taft took occasion to compliment Chairman Long, Manager Johnson and the members of the show committee on the splendid show they had arranged. The fact that the president visited the show is very gratifying to the entire motor car world, and particularly to the trade of Washington, as it marks his kindly interest in the industry. He is an ardent motorist himself and is keenly interested in motoring affairs. The fact that he has adopted the motor car as the official vehicle of the White House has been of immense value to the industry.

Aside from the president's visit the show was in every way the greatest of the kind ever held here, and numerous members of the trade from other cities had no hesitation in saying it was one of the finest dealers' shows ever held. The week's attendance broke all previous records, nearly 50,000 people passing through the doors during the week. It will undoubtedly prove of immense value to the local trade in the way of stimulating interest in motor cars. Nearly every exhibitor made direct sales during the week and they will be kept busy for weeks filling the demonstration orders that were booked.

Bad weather prevailed on Monday, Thursday and Friday of show week, but had but a slight effect upon the attend-

ance. Thursday was society day, at which time the admission price was doubled, and a notable crowd of diplomats, high government officials and society people joined with the near-great in making up the biggest crowd that ever attended a motor car show in this city. All in all the show was the greatest kind of a success, financially, artistically, and in every other way, and it has gone down in history as Washington's most successful show.

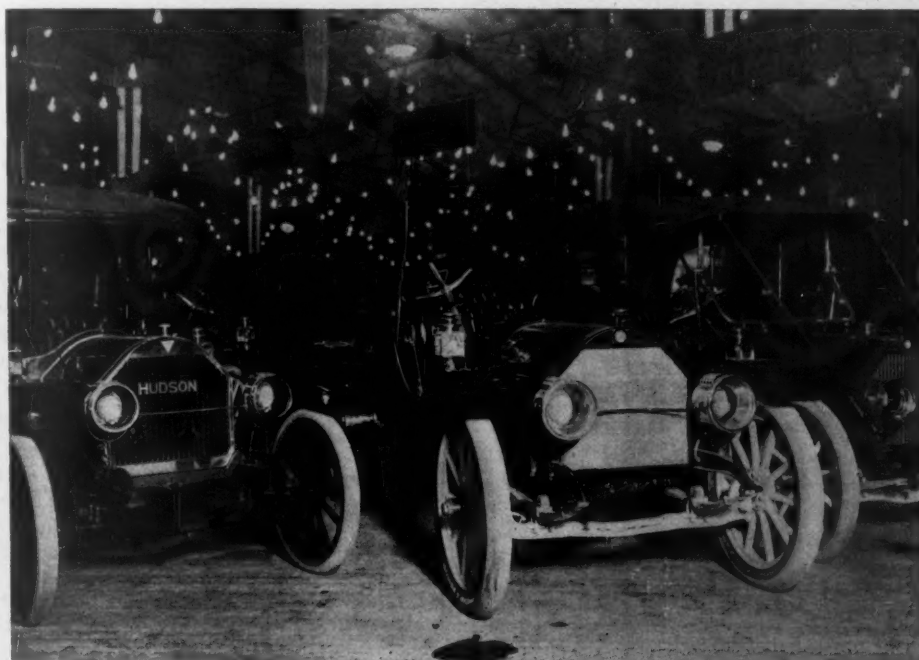
The formation of an effective dealers' association is expected to be one of the outcomes of the show. Steps are now being taken to round up the dealers. After its formation the association will be incorporated.

### QUAKER SHOW SUCCESS

Philadelphia, Pa., Jan. 31.—Beginning under conditions which presaged a frost—with a veritable blizzard to add force to the simile—the 2 weeks' show of the Philadelphia Automobile Trade Association wound up in a blaze of glory last Saturday night, with a unanimous verdict from all hands of the best ever. Funny how things will work out just the opposite to what everybody looked for. When the show opened the pessimists kept the air hazy with I-told-you-so's. A downtown show never would pay; 2 weeks was too long; the public wouldn't attend and would lose interest, etc., etc. And after the opening night, with the continued bad weather—it stormed 9 of the 13 show days, by the way—it did look as if the predictions of the knockers would be verified. But the first clear day broke the attendance record, and after that there was no holding the people back. It must be remembered, too, that in addition to

the drawbacks mentioned there was a constant fear of a sudden trolley men's strike that might leave thousands of show visitors stranded at the armory with very inadequate means of reaching their homes. But the public wanted to see motor cars, and they came in such numbers as to create a new record in attendance receipts. And the managers of the show were not the only satisfied ones. The exhibitors during the first week—all pleasure cars—were members of the association, and besides doing an excellent week's business there will be a rake-off for them which will not only insure them a return of the entire amount of their expenditures for space, but a neat little bit of show profit besides. The second-week contingent was in high feather. With the allurements of the high-class pleasure cars practically out of the way, the public was enabled to devote to the electric and commercial vehicle displays the attention which their merits demanded; the result was in almost every instance a bunch of orders which put all hands in a pleasant frame of mind. Even the accessories people profited by the fact that the display of pleasure cars was limited to the dozen or more concerns which had been unable to secure space during the first week. All of them reported an excellent week's business despite the fact that 4 of the 6 days were marked by snow or rainstorms. Taken all in all, the results were so extremely gratifying—especially when the conditions warranted only a near-success, if not an actual frost—that one of the show committeemen was led to remark, in a spirit of fun, that "perhaps it is just as well that there isn't a big exhibition building in Philadelphia!"

Army and navy night, on Friday, saw a large contingent of the government's representatives in the twin services present to inspect the various exhibits.



OAKLAND SHOW—EXHIBIT CONTAINING THE HUDSON AND CHALMERS

## Texas Interested In the Glidden

DALLAS, Tex., Jan. 30—If plans now being worked on are carried out Dallas will be one of the places the motorists of the next national tour will visit. Colonel E. H. R. Green, one of the most prominent members of the A. A. A., is in receipt of letters from the secretary of the association inquiring about road conditions, mileage, etc. This information is to be used in mapping out the prospective route. From the secretary's letter it is inferred that the tour will include southern territory. One of the routes suggested is from Little Rock to Hot Springs, then to Dallas, thence to Oklahoma City, then on to Wichita, Kan., and onward northward. Colonel Green stated that the main factor in determining whether Dallas would be included in the national tour or not was the condition of the roads between Little Rock and Dallas. The only satisfactory way to determine such road conditions will be to send drivers out in cars, and let them travel over the stretches of roads to be traversed by contestants. The secretary of the chamber of commerce gave S. M. Butler, chairman of the A. A. A. contest board, the following table of mileage, by railroad, between the cities the tourists intend to visit on the southern route:

	Miles
Nashville to Memphis.....	238
Memphis to Little Rock.....	132
Little Rock to Texarkana via Hot Springs.....	206
Texarkana to Dallas.....	175
Dallas to Fort Worth.....	32
Fort Worth to Oklahoma City.....	204

In the first half of the run between Texarkana and Dallas will most likely be found the worst roads of the route. The other roads along the route are above the average.

This suggested route if followed out will penetrate one of the richest sections of the south, where the honk of the motor horn and the murmur of the silent-running motors of the present time are seldom heard. Great good will be done to the industry in this section of the country, and it is the sincere wish of all southerners that they may have the pleasure of entertaining all who may engage in the next national tour.

### SOUTH'S BIG TRACK MEET

New Orleans, La., Jan. 31—For the two feature amateur races of the Mardi Gras speed carnival to be held here February 5 and 6, \$500 trophies have been donated for award by the New Orleans Automobile Club. The first is the Klaw & Erlanger trophy, a duplicate of that won by Mrs. Joan N. Cuneo last season, and the other the McCane cup. The McCane trophy will be awarded the winner of a 10-mile race which is open to amateurs and local chauffeurs and mechanics, any stock car being eligible. It will be run Saturday and is expected to bring out a field of seven drivers representing New Orleans, Atlanta, Chicago, St. Louis and New York, with possibly one entrant from Cincinnati. The

Klaw & Erlanger trophy is for strictly amateur drivers. It is for a 5-mile race. A third trophy offered at the meet is a handsome silver affair standing 36½ inches in height and valued at \$500. It is for the New Orleans championship and is offered by the Gentilly Automobile Co. Strang, Robertson, de Palma, Oldfield, Burman, Chevrolet, Harroun and others will drive at the meet.

### SAVANNAH HAS RACE BEE

Savannah, Ga., Jan. 31—At a meeting of the executive committee of the Savannah Automobile Club last Friday night plans were discussed for an international race to be held in Savannah Thanksgiving day. Besides having an international race it was proposed to hold a stock-car race the preceding day, making the program very similar to that of the grand prize race, held November a year ago. Another meeting of the committee will be held this week to go further into the matter. Work on the course has been going on for some time. Instead of having something like fourteen turns only seven will be found.

It has been decided by the Savannah Automobile Club to postpone the endurance run to Jacksonville from March 28 and 29 to some time in April. During the trip of the scout cars to that city it was found that the entire city was filled with tourists from the north and that rooms for those that would go on the run could not be had until the tourists began to leave for the north. The run probably will take place the first week in April.

### VIRGINIA WORRIED OVER TAX

Richmond, Va., Jan. 31.—Delegates have been named by the Virginia Automobile Association who are to attend the meeting in Washington which is to be held next month in the interest of national legislation. The committee named for Virginia is as follows: H. H. Trice, Tidewater Automobile Club, Norfolk; J. H. Mart-seller, president of the Roanoke Automobile Association; C. B. Richardson, chairman of the legislative committee of the Richmond Automobile Club; William E. Barrett, Peninsular Automobile Club, Newport News; N. C. Watts, Valley Motor Club, Staunton. The last two clubs are not members of the association in Virginia but have been included by President Joseph E. Willard of the Virginia association, on account of the interest that is evidenced in the respective sections.

As suggested in the letter issued by Chairman Charles Thaddeus Terry, of the national legislative committee, the incoming governor of Virginia is like many of

the governors who recently have been elected, much interested in the motor laws. At present there are many laws being considered and the legislature which has but just begun real business already has before it a bill to tax motor cars in Virginia at the rate of \$1 per horsepower. This proposed measure is being fought by the state association. The Virginia membership does not object to a fair tax, but the fee proposed is regarded as unlikely to meet with approval. A meeting of the Richmond association was held last week at which time it was decided that no objection would be held to a tax of even \$10 on each machine, but that the sense of the association was against such taxation as would make a 60-horsepower car pay a \$60 tax and pro-rata for other cars. At present the Virginia law is \$2 registration fee. This is of course admitted to be too low. The state is proposing to use the fund secured from the motor tax in the building of good roads. In fact more measures are now before the legislature for better roads than has ever before been the case in Virginia.

If sentiment can be taken as success the year 1910 will see an enormous increase in road-building in Virginia. De-

### Fattens the Envelope

Syracuse, N. Y., Jan. 31—As a means by which the employees may receive more pay the H. H. Franklin Mfg. Co. has adopted a system for those who do work of more than average efficiency. This system affects the men of the machine shop, running gear room, final assembly room, blacksmith shop, case-hardening plant, wood shop and metal body room. The total number employed in these departments is about 500. When a season begins and the new models are being manufactured the average time for work on every operation is taken for a month. For each blue print there is a card bearing the same number and showing the operations necessary for the making of the part designated. The average time for each operation is put on these cards. Every time an employe begins an operation he is given a premium claim card. This shows the order number, drawing number, operation number and his machine number. On it are shown also the number of pieces started, the number completed and the time taken to complete them. Two punches of a small time register show the start and finish. If a man completes ten pieces of a certain operation in 14 hours when the average on the cards in the accounting department shows that 2 hours for each piece, or 20 hours, were allowed, the saving of 6 hours is credited to the employe, and besides his regular pay he receives 50 per cent of his wage per hour for the amount of time saved. In this case, if he was earning 25 cents per hour his premium would amount to 75 cents. The company urges the workmen to earn premiums.





spite the fact that retrenchment has been the watchword of the legislature there has been no stringency as to good road appropriations, so far as they have yet come before the senate and house. The interest evidenced by both branches of the legislature in better roads shows the remarkable enthusiasm that has but recently been brought about on the subject. It is in the nature of a complete transformation of spirit, and there seems little doubt but that the motor car is the prime cause of the change.

## PROMOTION FOR W. M. LEWIS

Racine, Wis., Jan. 31—When the \$10,000,000 amalgamation of the Mitchell Motor Car Co. and the Mitchell-Lewis Wagon Co., both of Racine, Wis., was effected recently, William T. Lewis retired as head of both corporations to accept the post of chairman of the board of directors of the new combination, after having rounded out a half century of active life spent in manufacturing. Mr. Lewis is succeeded as chief executive of the \$10,000,000 business by his son, Captain William Mitchell Lewis, long one of the aggressive factors of the Mitchell Motor Car Co., and Republican candidate for governor.

## Disposition of Cars

Buffalo, N. Y., Jan. 31—"Where do all the cars go?" is a question that is frequently asked not only by the man in the street, but rather more interestedly, by the motor car manufacturer. It is an easy matter for his shipping or sales department to tell the latter into what territory the cars have gone, but unless he makes a more thorough study of the situation than that he will be at a loss to know just who buys the cars. Not long ago the Pierce-Arrow began a systematic inquiry along this line among its dealers. One result was the bringing out that for this year exactly 47.5 per cent, or practically half of the output goes into the hands of former Pierce-Arrow owners. Of the remainder 35.6 per cent are bought by those who had owned cars of other makes and 16.9 per cent to those who had never owned a motor car before. The sales of the year before were as follows: To former owners of Pierce-Arrow cars, 43 per cent; to former owners of others cars, 34.6 per cent; to those who never had owned a car before, 22.4 per cent. To analyze the matter still further, it is evident that Pierce-Arrow owners buy a new car on an average of a little over 2 years and that they look on this car as a staple article in their routine life. Another value from the figures gathered is the puncturing of the very general belief that a man almost always buys a low-priced car at first and, as he gains experience, buys one of a higher grade. The percentages show that 16.9 and 22.4 per cent of the 2 years outputs were taken by people who had never owned cars before.

# End of A. M. C. M. A. Is Predicted

NEW YORK, Feb. 1—Special telegram—The trade situation rapidly is coming to a focus, it being stated on good authority that the annual meeting of the American Motor Car Manufacturers' Association, which will be held in Chicago next week, will result in the organization being disbanded, the 5-year understanding having expired and it being conceded that there is little use maintaining the body now that most of the leading spirits have joined the Association of Licensed Automobile Manufacturers, which further emphasized the hold it has on the situation when it announced today that it now had on its list sixty-four concerns manufacturing cars under the Selden patent. Five American makers and two importers have been admitted recently, the former being the Acme Motor Co., making the Acme; the Cartecar Co., maker of the Cartecar; the Ewing Automobile Co., manufacturing the Ewing taxicab; the Fuller Buggy Co., which turns out the Fuller, and the Rapid Motor Vehicle Co., maker of the Rapid truck. The two importers are the Lancia and Delaunay-Belleville, the former the Hol-Tan Co. and the latter Brewster & Co.

Naturally, the newly-formed United States Motor Car Co. is attracting considerable attention. It is stated that despite the fact Maxwell is so prominently identified with it, the Maxwell-Briscoe company will not lose its identity by the deal; that it will run independently just as will other companies which cast their fortunes with the big holding corporation. It is understood that besides the Maxwell there are interested at the present time the Brush and the Columbia, car-making concerns, and the Ajax-Grieb Tire Co. and the Westchester Appliance Co.

The Columbia deal has just materialized, an inkling of it being secured when C. W. Kelsey, sales manager of the Maxwell, went to Hartford, Conn., to look for a home. It is said he is to run the Columbia plant, which is preparing to turn out 10,000 cars this year. This will give the United States Motor Car Co. a total output of 30,000 cars in 1910 and put Maxwell and Briscoe in a commanding position in the ranks of the Association of Licensed Automobile Manufacturers. Rumor states that Philadelphia capital is in the move, probably the Electric Storage Battery Co. interests, as well as the Metropolitan Street Railway Co. and the New York Transportation Co.

## Columbia in a Rumor

Hartford, Conn., Jan. 31—There has been a persistent rumor afloat in this city for the past three days to the effect that the Columbia Motor Car Co. will merge with

the Maxwell-Briscoe combination, that is the new \$16,000,000 holding corporation. A definite answer to the question as to whether or not this is the case is not to be had from those who know, or, at least, who should know. But it is pointed out that the handwriting on the wall tells the story. The United States Motor Co., of which the Maxwell-Briscoe company is the shining light, is here regarded as being in quest of the Columbia Motor Car Co. C. W. Kelsey of the Maxwell-Briscoe company appeared in Hartford last week and is said to be looking for a suitable home and rumor has it that he is to become sales manager of the Columbia Motor Car Co. Henry W. Nuckols, general manager of the Columbia Motor Car Co., was asked if it were true that Mr. Kelsey would join the Columbia forces. "Yes," he replied, "we are making negotiations to that effect." "Then it is not actually completed," was the question next put to Mr. Nuckols. "Not finally," he replied. Mr. Nuckols was then asked if he intended meaning the Columbia Motor Car Co. would join the United States Motor Co. "I don't," was his response and when again asked if the Columbia company would join the combination he stated that he did not know what the stockholders in New York intended to do. In response to the status of Mr. Kelsey should he locate here Mr. Nuckols said that he would be here in the capacity of sales manager of the Columbia Motor Car Co. The output of the Columbia Motor Co. in 1909 was 250 gas cars and fifty electrics, yet there are ample facilities for increasing the output without going out of the way to do so.

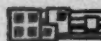
## MOTOR CREDIT MEN MEET

New York, Jan. 31—The fourth annual meeting and dinner of the Automobile Trade Credit Association was held at Hotel Astor on January 19. Benjamin D. Traitel, of the Traitel-Marbel Co., organizer and first president of the Credit Association of the Building Trades of New York, gave a forcible 20-minute talk on the advantage of coöperation as illustrated in the work accomplished during the 3 years' life of the Building Trades Credit Association.

## BIG RUN NOW ON

Rochester, N. Y., Feb. 1.—Twenty-two entries have been secured for the second annual endurance run of the Automobile Club of Rochester which will be held tomorrow and Thursday. The affair is a 2-day test to Syracuse and return, and the trip is taken for the purpose of advertising the show of the Rochester Automobile Dealers' Association. Entered in the affair are three Seldens, two Reos, two Fords, three Chalmers, two Cadillacs, two Cunningshams, and one each of the Oakland, E-M-F, Gaeth, Speedwell, Pullman, Maxwell and Franklin.





## BAY STATE COMMISSIONERS FILE REPORT

BOSTON, Jan. 29—The annual report of the highway commission to the legislature contains a lot of interesting matter relative to motoring. Facts and figures are given that show the commission has been busy in many ways during 1909; it promises to be even more so this year.

When the fiscal year ended November 30, there had been constructed 784.63 miles of state highways since the commission first began operations. This represents an expenditure of \$6,936,031.10. The highways improved up to the date given above comprised 193.36 miles, for which \$384,111.78 was allotted. During the past year the commission laid out 36.53 miles of which 30.03 have been completed. The small towns were allotted \$73,625 and 30 miles of public ways under small towns have been improved. These ways remain under control of the small towns and connect with the through state roads.

The commission states that its estimate for 1910 for highways is \$250,000 from the state, which with \$150,000 to \$200,000 from motor fees will give more than \$400,000 for the year. While this sum is not considered sufficient, yet it is thought best to be conservative in the use of new methods of construction and surfacing and much may be done within the amount available.

#### Not Enough Funds Last Year

Last year the engineers estimated that \$684,800 was needed for the roads and \$394,131.01 was spent. This was not nearly enough, but the commission adds that it is only fair to say that considerable progress was made toward restoring the roads to better condition. It is hoped now to keep all roads in reasonable repair and gradually get them all back into better condition.

Much has been accomplished toward the completion of various through routes. The highways in the Berkshires are now in such shape that there is practically a continuous trunk line from Boston to Albany. One of the best pieces of work done was the elimination of Jacob's ladder, the bane of all coming east or going west in that section.

The New Hampshire road from Nashua has been united with the Bay State road that borders the Merrimac river, and with the trunk line completed in the former state there will be a through road to Bretton Woods. Much has been done along the north shore road that also reaches to the New Hampshire line and which will eventually join another mountain highway, giving motorists both seashore and mountains on one day's run.

The route down to Cape Cod running to Provincetown is being gradually finished and soon there will be a splendid road all the way down by way of the south shore. Some progress has also been made on the

road that goes north and south along the Connecticut river. This highway will join Vermont and Connecticut roads.

The number of petitions for highways grows less annually because the main lines are already petitioned for, there being 826 now on file representing 2,003.16 miles. The allotment for small towns voted for in 1908 has been practically exhausted now.

#### Varied Road Construction

Some idea of the varied construction arranged for by the commission may be gleaned from the following figures: 20 miles plain macadam, 4½ macadam with oil and sand coating, 1¼ grouted with tar, 2¾ upper course stone coated with tar, 2¾ ordinary gravel, 6 to 7 asphaltic oil and sand 3 to 4 inches thick. About 42 miles were resurfaced and bituminous binder and screenings were used on 115 miles, making a total of about 157 miles so cared for. The commission also constructed twelve concrete bridges.

One of the most important moves of the commission during the year was the taking of a traffic census during August and October. This gave much valuable information and was worth all it cost, for it gave an idea what roads were heavily traveled and what were not, so that it is possible now to figure out better the maintenance cost. The figures compiled as a result of the census follow:

Horse-drawn	August	October
Light	19,622	18,456
Heavy	17,969	17,967
	37,591	34,423
Motor cars		
Runabouts	5,922	3,395
Touring cars	21,387	14,514
	64,900	52,952

This gives an average during August of 58 per cent horse-drawn vehicles and 42 per cent motor vehicles, while for October the average was 65 horse and 35 motor. August of course was a month when the traffic was abnormal, due to the large number of motorists not alone in this state but others from elsewhere touring New England.

#### Fall Figures Given

The total average for each of the stations, there being 237 in August and 240 in October, showed that in the former month 274 vehicles of all kinds were counted, these being divided 159 horse and 115 motor, while in October the figures were 221, for a total divided 144 horse and 77 motor. This showed of course that the October travel, which is regarded as normal, gave a lower percentage of motor cars traveling about.

The total number of vehicles counted daily during August at the 237 stations averaged 64,900, while in October the daily average for the 240 stations was 52,952. As a result of all the figures compiled for the commission it has been possible to map out twenty-one primary routes

throughout the state. Some of these of course are more popular than others, for instance the ones going along the north and south shore, and also through the Berkshires and the route going from Springfield to Connecticut.

The commission learned that on ordinary roads where motor traffic is not heavy stone roads can be preserved with sand at a cost of from \$140 to \$200 a mile. The report states that it seems as if a surface coating of oil, if of proper quality, would materially benefit for laying dust and preserving the road surface where there is enough motor traffic to make a binder necessary and where the traffic is not too heavy, say from 500 to 800 vehicles of all kinds a day. Only in a few instances have roads failed or gone to pieces.

#### As to Motor Laws

The report states that few criticisms have been heard of the motor law passed last year and that it should be left intact unless some serious defect is discovered. The only criticisms have come about as the result of the narrow interpretation by certain judges contrary to the interpretation by the vast majority of courts. These related to minor matters and they will rectify themselves in the near future. The four sections of the law that went into effect July 1 seem to have met the approval of all, it states.

The commission was asked to approve only a few special regulations and but one or two towns have even attempted to make special regulations. Believing it both fair to the public and to all users of the highway the commission has not approved any of these regulations. In a few cases where narrow roads that did not connect main highways were asked to be closed this was allowed to be done.

That the commission kept an eye on the users of motor cars is shown by the fact that 200 licenses were suspended or revoked during the year. This was divided as follows: Sixty-eight revoked, 132 suspended. There were 155 hearings on these cases. In some instances the law automatically brought about a suspension or revocation and after a hearing when it was brought out that the operator was not to blame the licenses were restored. There were thirty-one such restorations.

The commission investigated 241 cases against motorists and in thirty-three prosecuted them in court and secured convictions. There were 1,130 collisions, of which 826 took place in the day and 304 at night. There were 816 in the city and 314 in the country. The collisions at night did not show a very big increase over the year previous and this tends to prove that drivers are not indulging in so many joy rides as formerly. As a result of the accidents there were fifty-four people killed, nineteen being motorists, thirty-two pedestrians and three bicycle riders. The in-



jured totaled 989, of which 339 were motorists.

The commission received from the courts 4,062 abstracts of records and of the convictions in lower courts amounting to 3,725 there were 2,475 charged with over-speeding. The others were for minor offenses. The total number of fines imposed reached \$39,181.61. Under the new law all fines now go to the commission and the money will be added to the road maintenance fund.

## Registrations and Fees

The total receipts from all sources connected with the motor car department reached a total of \$169,973.54 for the year. That it will go above \$200,000 and perhaps reach \$250,000 for this year seems probable. The cars last year were registered at a flat rate of \$5.

## RACING TEAM FOR E-M-F

Detroit, Mich., Feb. 1.—Pending the final settlement of its litigation with the Studebaker Automobile Co. of South Bend, the E-M-F company of Detroit has been sparing no effort to keep its gigantic plants working at top speed. The company has authorized the astonishing announcement that, since the date of the rupture of relations with the Studebakers, it has marketed independently \$14,000,000 worth of E-M-F and Flanders cars, deposits on which have been received from dealers all over the country. The E-M-F company also announces its purpose of placing a racing team in the field during the coming season, provided that the rules are so changed as to make stock-car races genuinely representative of the cars produced as regular models by the manufacturers. The E-M-F company already is organizing its racing team and has three well-known drivers working at its plant. One of these is George Soules, who gained a reputation as a member of the Pope-Toledo racing team. George Meinziger, who drove the Glidden tour pathfinder last year, will be one of the drivers and a third will probably be Francois Jelleneau, a French driver of considerable experience. The company is also negotiating with several of the star drivers of last year and may build two cars for use in the open events. Formal closing of negotiations is necessarily suspended until the final decision in the law suit with the Studebakers, whose attempt to persuade the United States court to prohibit the E-M-F company from selling its cars independently is still under advisement, though Judge Swan is expected to announce his decision very shortly.

## GOOD ROADS SUGGESTIONS

Milwaukee, Wis., Jan. 31.—The Wisconsin joint legislative committee on good roads has filed its report with Governor James O. Davidson. The bill is drawn on upon a democratic theory that the building of roads is a work that must be done by the people, that the results are for the people and that the people are to be held

in first consideration. The report in brief makes the following recommendations:

A state highway commission to consist of three members, one to be a civil engineer, appointed by the governor for 2 years, by and with the consent of the senate, the civil engineer to receive \$3,000 and the other members \$2,400 a year, all to devote their entire time to the work.

The commission to have power to appoint three assistants, one at \$150 a month and two at not to exceed \$100 a month, and a clerk at \$1,000 a year, independently of the civil service commission and subject to dismissal at will.

The commission to carry on experimental work, locate and examine clay and gravel beds and rock quarries in the several counties and act in an advisory capacity on the road work of each county.

The state treasurer to set aside \$25,000 of the annual appropriation as the state highway commission fund, 5 per cent as the state highway maintenance and repair fund and the balance as a highway construction fund.

County boards to designate county systems of highways to be improved and to elect a highway commissioner for 3 years at not less than \$3 a day, and may appoint an advisory board of three of their own members to act with such commissioner.

Counties authorized to levy a special highway tax of not to exceed 2 mills and towns of not less than 1 nor more than 2½ mills for purposes of highway improvement or construction.

The county to appropriate as county aid one-half of the amount expended by any of its towns in highway construction, the aggregate of such levies not to exceed 2 mills on the dollar on the assessed valuation of the county in any one year.

The state to recompense the county for such expenditure on the basis of the county valuation, the amount varying from 34.5 per cent for counties of less than \$10,000,000 assessed valuation, according to the state board of assessment, to 51.9 per cent for counties of \$70,000,000 and over.

The county clerk, on the receipt of the award from the state fund, to apportion the same among the several towns of the county.

The bill appropriates \$300,000 a year for 6 years for the purposes of the act.

All highways receiving state aid shall have a road bed at least 24 feet in width with a top dressing of stone or gravel at least 9 feet in width.

The roadway must consist of loose stone or gravel not less than 8 inches thick laid in two courses, no course to be over 5 inches thick before rolling. The weight of the roller used shall not be less than 8 tons. The supervision and construction of state aid highway roads shall be done by the town and county authorities, but under such rules, regulations and instructions as the state highway commission shall provide.

There are several recommendations aside from the bill for future legislation suggested by the committee and they are as follows:

That all highway taxes be paid in cash.

That the licensing of motor cars be transferred from the secretary of state to the department of highways.

That the present license fee on motor cars be made an annual one and that same be increased not to exceed \$5 per annum for each car.

That the legislature make provision for compiling all laws now in force relating to highways.

## HOOSIER ROAD LAW VALID

Indianapolis, Ind., Jan. 31.—One of the most important decisions ever handed down by the Indiana supreme court was given last week in deciding that the road laws of the state are constitutional. As a result work has been resumed all over the state and plans are being made for more extensive work in this direction than ever before. In November the supreme court held the laws were unconstitutional and about \$2,000,000 worth of work was stopped. The validity of about \$10,000,000 worth of road improvements also was questioned. The case was reopened and the new decision given, two of the five judges dissenting.

The case upon which the validity of the

laws has been settled was that brought by Samuel H. Smith against the commissioners of Hamilton county. Smith held the laws were unconstitutional on the ground that one provided improvements could be made only in townships in which there was an incorporated city or town of less than \$30,000 inhabitants and that both laws were invalid because they provided for taxation. His first contention was based on a section which read: "Whenever a petition signed by fifty or more freeholders and voters of any township, in any county of this state, includes any incorporated town or city in such township, having a population of less than 30,000 inhabitants, praying for the improvement of a highway," certain things might be done in the way of road-building.

The supreme court holds the word "includes" should be "including," and that this would mean any township could proceed with an improvement, as well as any city or incorporated town of less than 30,000 inhabitants. One of the laws provides that an election to determine whether or not a road shall be built or improved shall be held on the petition of fifty freeholders or voters.

## ONE GOOD ROADS BOOSTER

New York, Jan. 31.—If the recently revived Illinois State Automobile Association needs powerful assistance in the securing of good roads through the state it has a friend in former Lieutenant-Governor Sherman of Illinois, who delivered an address before the annual dinner of the Automobile Club of America tonight, when he declared that it would be far better to spend the \$20,000,000 appropriated by his state for a deep waterway for good roads rather than wasting it on aquatic dreams, as Mr. Sherman terms it. After declaring the waterway scheme as visionary, Mr. Sherman said:

"The hope to regulate by creating competing lines is a delusion. Farmers who have been sensitive about hard country road taxes seem to have overlooked this movement. The \$20,000,000 lately voted and sought to be used to scoop out an endless avalanche of mud in Illinois would build 4,000 miles of hard roads at \$5,000 per mile. More than ten country roads reaching from the north end of Illinois to the southernmost tip could be built with it. The repair and maintenance cost is less than inland waterways. How many votes would a \$20,000,000 bond issue to run a hard road along inland farms have got? That is near enough home to understand. Everybody can travel on it with every kind of motive power; horsepower, gasoline, electricity, steam, with every vehicle, ancient or modern, accommodated. The inland waterway is far off. Distance lends enchantment to the view. The statesmen are always absent when the tax collector is present. It is time to wake up, all who drive horses or motor cars or go a-foot."



# The Readers' Clearing House



## MOTOR FOR WELL DRILLING

FULLERTON, Mont.—Editor Motor Age—I have a steam traction well driller, and desire to replace the steam with a gasoline power plant. Can Motor Age give me some information as to what would be the best gasoline engine for this purpose. In reading the accounts of the various contests between motor cars, trucks, etc., described in Motor Age, I can readily see that for endurance and reliability the small high-speed motors are ahead of the heavy duty, low-speed engines. My 14-horsepower engine is too small. It and the boiler together weigh about 8,000 pounds and I find this excessive weight a great drawback in moving about, as it requires so much power in a rough country to propel itself. To overcome this I want to get a light motor, one that will stand continuous work through a period of 8 or 10 hours. Would it be advisable to get one with a higher horsepower rating than actually required to do the work? By doing this would it lessen the tendency of the motor to overheat? Would the type of motor used in the heavy trucks suit my purpose?—A Subscriber.

A 30-45-horsepower motor will meet with your requirements. Such a motor of the gasoline car type will operate at 900 to 1,500 revolutions per minute, will be of light weight and capable of being set to operate at all altitudes in that section of the country. By all means get a motor with excess power, so that if necessary it can be speeded up and without injury to itself meet every requirement of the service you may have.

## LIGHT VS. HEAVY CARS

Rockford, Ill.—Editor Motor Age—There are a great many problems in the motor car industry that have not yet been solved; and it is the writer's opinion that the greatest problem yet to be solved is that of the coming car, or, in other words, the practical car of the future that any man can operate any day in the year. The average car buyer today is not a mechanic; if he is a doctor or a business man he expects to use his car nearly every day, but owing to the large number of complicated moving parts, something has gone wrong just when he wanted the machine the worst and it has to go to the repairman. As a result we have a very large number of repair shops filled with cars to be repaired, that should be out doing service. The repairmen seem to own the motor car of today, I believe.

The car of the future must be light in weight, accessible in all its parts, and as simple in design and construction as possible. Right here, I might add a few sug-

**EDITOR'S NOTE**—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

**NOTICE.**—Motor Age is in weekly receipt of communications for the Readers' Clearing House signed Subscriber, Reader, and other nom de plumes. Hereafter Motor Age will refuse to publish in these columns any communications other than those properly signed. Where the correspondent does not wish his name to appear he may select any nom de plume desired, but his name must accompany each communication to this office as an evidence of good faith, otherwise it will not be considered.

gestions that may be of some benefit to a certain class of buyers. First of all, find out what the car weighs on the scales with full equipment, all ready for a long run; don't take catalog weight. Then note how the weight is distributed, see if the tires, bearings, frame and axles are of ample size; and know that the motor has plenty of power for the weight of the machine. See that the two sets of brakes are on the rear wheels. Why should we strain the frame, drive-shaft, transmission, bevel gears, differential and rear axle with a brake more powerful than the motor, when it is simply the rear wheels that control the car? Also see that there is plenty of road clearance. Note the wearing parts of the motor as to their hardness and adjustments for wear. The finish should not be neglected, and workmanship, assembling and adjusting should be carefully examined.

Now, the most important features to be considered in the makeup of a car are simplicity and accessibility, as they should go hand in hand in motor car design. Take note of the number of parts you would have to remove, replace and readjust in order to make a slight repair or adjustment. The editorial in Motor Age, issue January 20, page 8, entitled "Factories Must Tune Cars" is the best I have seen in print, as manufacturers are so eager to make deliveries that the final test and inspection are sadly neglected.

As to the heavy car, it must go. There is many a car owner, today, who never knows what his machine and equipment really weigh. Some makers do not quote the weight, whereas others give weight of the stripped car, or the car minus tires and all other equipment. Therefore, in most cases, we can add from 300 to 900

pounds to catalog weight, for the real weight of a car is when it is ready for a trip. Motor car designers used to have the idea that a car should be very heavy in order to hold the road at high speed; but today, some of our lightest cars are easier controlled than our earlier models of heavy ones. It is all a matter of balance, or distribution of weight. A car that is lighter in front than in rear is not liable to skid. A great deal of credit should be given to the few makers who are striving to build a light-weight car along scientific lines. The heavy car is the one that wears out tires, and the tire is the main expense of operating a car at present. Some makers claim they have a simple motor because they have cast all four cylinders en bloc, yet the number of working parts remains the same. In my opinion, the en bloc motor has not much advantage from the owners' standpoint. For example: If a valve seat cracks, a cylinder becomes scored or otherwise defective, the owner is obliged to buy the entire block of four cylinders in order to replace one; then he must have all valves ground in and timed, to say nothing of the various other adjustments. So the gain is to the manufacturer only. As long as we retain the present four-cycle system, we cannot expect to have a simple motor. To simplify our motors we must reduce the number of working parts. The two-cycle system solves the problem, as it does away with all valves, springs, pushrods, cams, camshafts and gears. During the past season, the two-cycle motor has put up a good performance in both endurance and speed contests. The six-cylinder is favored by many because of its flexibility and even application of power, which is correct, as the crank throws are at 120 degrees, which allows three explosions to one revolution of the crankshaft instead of two, as is the case with the four-cylinder motor. Now, if three explosions are better than two, why are not four better than three? The four-cylinder, two-cycle motor, with cranks set at 90 degrees, give us four explosions to each revolution of the crankshaft; therefore the explosions overlap and the applied power is constant; it also should be just as flexible as the six-cylinder, four-cycle. The six-cylinder motor has twelve valves, which require more or less attention in order to retain a smooth running motor; and right here I might add are due to the valve, which is a trouble-maker.

Engineers are simplifying the igniting apparatus to a great extent. Some of our makers continue to use a separate coil and vibrator for each cylinder, but the vibrator



coil is fast being done away with as it is a trouble-maker and found to be absolutely unnecessary. The most common ignition at present seems to be the double system, consisting of magneto and auxiliary set of batteries with non-vibrator coil. We also have a simple and practical igniter, known as the Bosch high-tension make-and-break system, that requires no battery, coil, vibrator, or timer, all of which only add complications and annoyance.

The construction of the average car is far from perfect. The body and frame of a carriage are mounted on three points, so when a wheel is raised there is very little side strain or twist on the frame. The motor car has no provision for the unevenness that exists on our roads. For example: Jack up either a front or a rear wheel to the height of 6 inches off the floor and then note the great strain that is applied to the axle, springs, frame and, in turn, to the motor. With some of our earlier cars, placed in that position, it would be a hard job to crank the motor. To overcome that strain on the motor, makers of today construct what we call a single-unit, three-point support power plant, or a combination of motor and transmission mounted at three points in the frame. The frame, springs and axles remain just as heavy and stiff as can be made; the motor occupies the easiest position in the car, the passengers the hardest. It is no wonder our cars must be heavy and ride hard. The motor cycle is a good example of light-weight construction. It will safely carry three times its own weight. Our motor cars when loaded to one-third their own weight are considered overloaded. In some cases it seems that our designers have forgotten the value, use, and meaning of accessibility. We have motor cars today that should the replacement of a piston, piston ring, pin, connecting rod, or a slight adjustment of same be required, the repairman must first remove the radiator, the dash, then the car must be jacked up and the rear axle removed, then the motor and transmission must be completely removed from the chassis. After adjustment is made, the above performance must be reversed. As a result the repairman has a bill and the owner has a kick, for which neither is to blame. The owner pays the bill, and the designer should take the blame. As I study the many different de-

signs that we now have, I have come to the conclusion that the brains of the American inventor and engineer have not yet been thoroughly applied to the motor car problem. The question is often asked: Why do water-coolers predominate? One reason for this is that makers tried to build air-coolers without first making a study of the principle; they thought the air-cooler could be made as easily and on the same lines as the water-cooler, which was not the case, so they turned to that of least resistance, water. A few of our makers continue to battle on air-cooler ideas, and today air-cooling is a success. Our air-coolers have records that prove the use of the radiator to be absolute folly.

Personally, I favor the air-cooled motor, for several reasons: In the first place, all gas engines are air-cooled either directly or indirectly. If you don't think so just remove your fan belt and hang something over the front of the radiator and see what will happen. Water-cooling is still an experiment, as the makers are continually changing the system of circulating, style and sizes of pumps and have been known to change twice during a season. In trials and tests of all kinds the air-cooled motor has proven to be more efficient under all conditions considering piston displacement. The gasoline consumption is far less than that of the water-cooled. These facts alone are worth considering, and then the air-cooled motor relieves a car of from 175 to 325 pounds of dead weight, just in the right place; then besides there is nothing to leak away, boil out in summer, or freeze up in winter. The two-cycle motor, which I have mentioned before, can be cooled more easily than the four-cycle, and in conclusion I am of the opinion that our coming car may be equipped with a four-cylinder, two-cycle motor. It seems to me that a 30 to 40-horsepower motor on 40-inch rear wheels with a gearing of, say four to one on the high, and a complete weight of not over 1,000 pounds would make an ideal combination. Let us hear from others along these lines.—Charles W. Yeager.

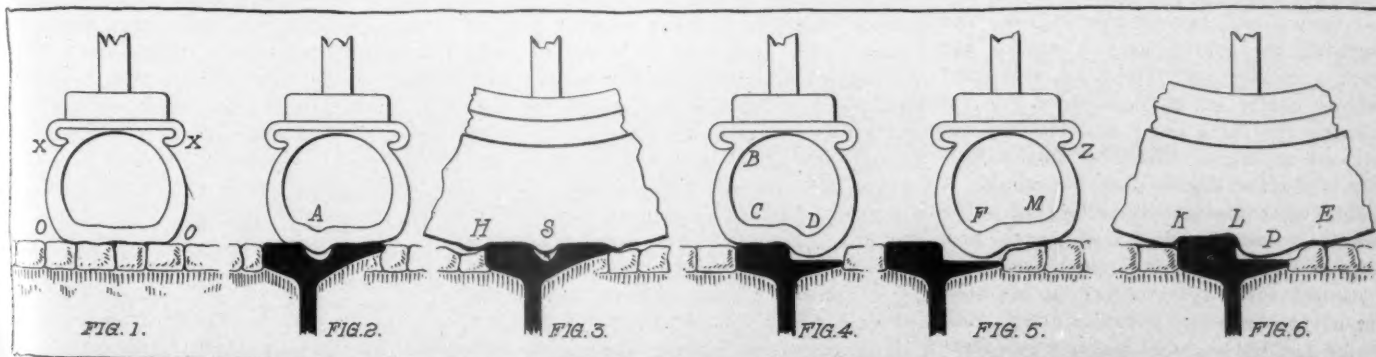
## EXAMPLES OF TIRE WEAR

Chicago—Editor Motor Age—I am sending herewith some tire illustrations which may be of interest to Motor Age readers and I hope will create some discussion on tire wear. Fig. 1 shows a Diamond 34 by

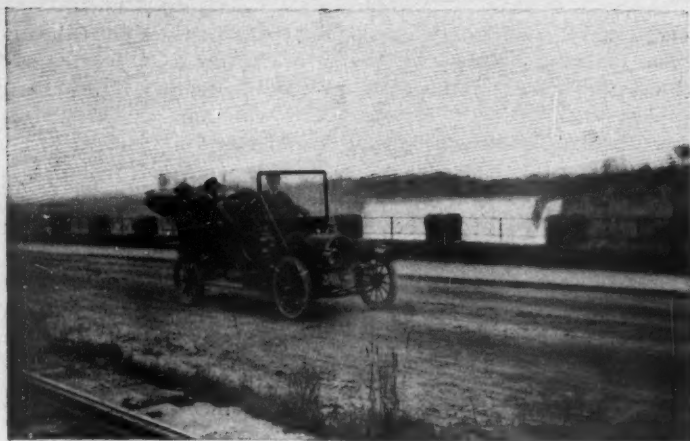
4-inch at 60 pounds pressure on plain surface paving bricks, the wide wearing surface of the tread appearing from 0 to 0, and sharp cuts will cause clincher or rim cuts at XX. Fig. 2 is a Diamond 34 by 4-inch, 60 pounds pressure, following a grooved street car rail, which does not affect the tire any more than the paving bricks, except the small groove strains at A. Fig. 3 shows a Diamond tire 34 by 4 inches at 40 pounds pressure crossing a grooved rail which sometimes causes a rim cut at H, that is if the pavement is not level with the rail, and a small strain at S. Fig. 4 is a Diamond 34 by 4 at 60 pounds pressure following the old style rail, in which only one rim cut appears at B. Great tire wear is shown at C, and great tire strain at D. Fig. 5 is a Diamond 34 by 4 at 60 pounds pressure following the inside of the old style rail. The rim is cut at Z and great tire wear is shown at M and great strain at F. Fig. 6 illustrates a 34 by 4-inch Diamond tire at 40 pounds pressure crossing the old style rail. The rim is cut at K, a rim blister appears at L, a rim bruise at E and tire strain at P.—John H. Quo.

## TOURS IN FRANKLIN CAR

Syracuse, N. Y.—Editor Motor Age—Since 1900, with the exception of 1 year, I have made a yearly pilgrimage to Canada, a distance of 1,900 miles, in my Franklin cars, either in the late summer or fall, fishing or hunting according to the season. Leaving Syracuse I go through Buffalo to Port Colborne, Ont., following the shore of Lake Erie to London and then go northward past Lake Simcoe and through the wild section of Muskoka, the great deer country. There are miles of unpopulated territory where the roads are a succession of rough clay, ruts and water bogs, yet I never have found touring the rough roads a hardship and my car has stood the journeys well. I have had few unpleasant incidents. I laugh now about one of my early trips when I ran out of gasoline in a pouring rain 12 miles from any habitation. The one good piece of road on this route is the famous Lundy's Lane near Niagara Falls, Ont. This annual pilgrimage is a trip to my old home in Brantford, and the only drawback now to these trips is that under new laws in Canada shooting is restricted unless the hunter has been a resi-



AS JOHN H. QUO ANALYZES TIRE TROUBLES AND WEAR



FRANKLIN PASSES NIAGARA FALLS



OVER A HUMP BRIDGE IN ONTARIO

dent of Canada for 6 months. I was early a motor enthusiast and had the bug early. Before the time of motor cars I had a bicycle and was one of the first to ride in Ontario, and made the trip from Buffalo to Brantford when the machine was such a curiosity that a crowd gathered everywhere. It was little better when I first began going up in the Muskoka district with a motor car because in some of the out-of-the-way places the inhabitants had never seen a motor car and whole villages turned out to gaze at the wonderful road locomotive. Yet I think the trip really was easier in the old days because now the laws have become so strict that tourists are arrested on trifling charges. Moreover, Canada has hump bridges. These may have been built for drainage but they are equally effective in stopping motor cars. Touring each year through the peach district of one of Canada's finest fruit belts, the northern slope of Welland county, I ride along with my family, enjoying the passing miles of scenery that shifts and grows more beautiful as they go on. The large hedges make green frames for the picture of fertile fields beyond. Sometimes a hedge arches an entrance to a peach orchard. Farther north the country grows wilder, and habitations are infrequent. My one bit of advice to those following this route is this: He who expects to motor successfully in Canada must be of a benevolent disposition and take some one out riding in every town he visits. They expect it, and it saves trouble.—J. A. Seitz.

## TWO-CYCLE MOTOR FOUR-CYCLES

Fergus Falls, Minn.—Editor Motor Age—  
I have a 1907 two-cylinder Maxwell and replaced the engine some 6 months ago with a two-cylinder, two-cycle, three-port marine engine of 20 horsepower. I was running the car a great deal last summer without an engine trouble of any nature, but lately the engine does not run as it should when the load is thrown off. The engine mis-fires, runs four-cycle and fires back in the crankcase. I also have a single-cylinder two-cycle engine in my boat but never notice any irregular firing. Will Motor Age tell me what makes a two-cycle engine run four-cycle, and how can I stop

the back firing in the crankcase?—C. J. H.

Crankcase explosions are due generally to the exhaust gas in an incandescent state rushing through the transfer passage into the crankcase and setting the gas on fire. If the mixture is weak and the crankcase compression low, the period of inflammation is long enough to set the incoming gas on fire as soon as the intake port opens and there will be an explosion in the intake pipe and carbureter. Crankcase explosions also are due to preignition. The deflector gets too hot and sets the incoming charge in flame as soon as the transfer port opens. This overheating of the deflector can be avoided in casting the deflector integral with the piston and finishing the piston top and deflector by filing, scraping and polishing with emery cloth. When running on low speed and consequently on low compression, it is necessary to enrich the mixture and to advance the spark. You can stop crankcase explosions not only at low speed by advancing the spark, but in fact at any speed. A fine screen properly set near to the transfer port will also avoid crankcase explosions.

When you throttle the engine down, less fresh gas is allowed to enter the working cylinder and more of the burned gas remains. If throttled sufficiently the large amount of burned gas dilutes the fresh gas so that the mixture is too weak to be ignited. Some of this mixture will go out as soon as the exhaust port opens, the rest gives with a new charge of the second stroke a richer mixture and will be ignited and a working stroke occurs. The cycle then is repeated and the motor runs four-cycle. But since this four-cycling does not occur when the motor is working under a load, as in your case, it is not of much importance because the four-cycling of a two-cycle motor does not waste any fuel or cause explosions in the muffler, but of course a two-cycle motor should work two-cycle under all conditions. A variable compression chamber cubic content by means of a relief back to the crankcase would avoid the four-cycling but this speculation as far as known never has been tried out and it is a question whether there would be anything gained in making the simple two-cycle motor just as complicated as a four-

cycle motor. A pure air charge with fuel injected at the intake port increases the flexibility over that of a crankcase compression motor. The writer saw some time ago a little single-cylinder motor for farmer's use where no pump was used. It was enough to permit liquid fuel to enter the pure air charge as it rushes into the intake port. This engine was just as flexible as any four-cycle can be made. Your engine is of the marine type and designed and built for constant pull, but you can easily replace same by a motor car motor of same size which will give you more satisfaction. There are several good two-cylinder two-cycle water-cooled motor car motors on the market.

## TWO-CYCLE HORSEPOWER

San Antonio, Tex.—Editor Motor Age—  
Will Motor Age answer the following: 1—What would be the correct figure to multiply the result of horsepower formula of the four-cycle to get the horsepower for a two-cycle engine? In other words, what proportion do you consider the power of a two-cycle engine to that of a four? 2—Would a double acting, two-cycle engine get too hot to run? 3—Is there any successful double-acting, two-cycle engines on the market? 4—Which requires more power to drive a 3,000-pound car, chain or bevel gear?—J. I. Shepherd.

1—The two-cycle motor is not so well standardized as the four-cycle, it does not give so dependable an output. On this account it is difficult to state a rule for comparison that is of any value. It has been pretty generally accepted in the past, that the motors take 50 per cent more fuel for the same power but the later motors undoubtedly do better. Adding about 50 per cent to the four-cycle table will indicate as much power as you can expect, although there are exceptional motors which will give more. Taking D<sup>2</sup>S.N

18000

as a formula for the four-cycle motor horsepower, then the two-cycle formula horsepower =

D<sup>2</sup>S.D

13000

will give results which agree very closely with those obtained from actual practice.



2—Yes, a double acting two-cycle cylinder will be hard to cool, but not any harder than a double-acting four-cycle cylinder, as the burned gases remain in the cylinder less than half the time of the four-cycle. There ought to be something new done in the way of packing the piston rod, to make it stand the heat.

3—Yes, sometime ago there was a description in the American Machinist of the Rice double-acting two-cycle motor. Write to John V. Rice & Co., Bordentown, N. J., or to the De La Verze Co., Port Morris, N. Y., for a catalog. Double-acting two-cycle motors are now the leading European prime mover, and are made in very large sizes up to 8,000 horsepower or more.

4—To compare a 3,000-pound car with chain-drive with one with bevel gear is not easy in the space at command in this column. There is, however, no dividing line above or below which one is better than the other. If you mean a single direct chain, the loss of power is very slight, about 5-8 per cent, but a single chain will hardly do for a 3,000-pound car. Now using two chains you have a countershaft provided with a propellershaft and this may require more power than a live axle and propellershaft alone, the loss of power will be about 15 per cent, but there is always power lost as soon as the chains get dirty and as it is a hard matter to protect the chains from dirt, shaft drive cars are more used.

## USES A NEW FUEL

Rhineland, Wis.—Editor Motor Age—Two Rhineland young men, one a chemist the other a machinist, have produced a most astounding invention, and one which bids fair to solve the fuel question in cars. The inventors are as yet reticent in their statements, but say that as soon as they have secured domestic and foreign patents they will furnish the press with full particulars. The following facts are known, however: The chemist some weeks ago discovered an explosive which he manufactures through the action of fulminic acid on hardwood sawdust, and



A WINTER SNOW BLOCKADE IN KANSAS

tri-fulminate of cellulin is the chemical names he gives it. On explosion it is completely dissipated into gas, leaving no residue, and it can only be exploded by coming in contact with flame. The machinist has built what he calls an automatic insufflator which automatically feeds into the cylinders of any gasoline engine, directly at the blue flame of the spark plug 1/4332 of a grain of the explosive for each 6-horsepower cylinder. The insufflator is controlled by the throttle lever the same as in using gasoline. A two-cylinder, 18-horsepower machine was tried out here today with the two insufflators attached and did everything that the same machine was formerly capable of doing with gasoline. J. M. Darrow, the machinist, declares that it will be possible to fit a four-cylinder engine with four insufflators complete for \$100 and that the machine can be run 10 miles for 1 cent. As soon as the full details of the invention can be made public the writer will send them to the Motor Age.—J. N. Nixon.

## USING LARGER TIRE SIZES

Peotone, Ill.—Editor Motor Age—A Reo light touring car, when purchased, was fitted with 30 by 3½-inch tires. New tires are required for at least the rear wheels. Would 31 by 4-inch tires be more economical, the

difference in price considered? The owner of this car has run it for three seasons, covering about 5,000 miles, and has expended about \$100 in tire upkeep. Is this high or low? I maintain that the 31 by 4-inch tires would be vastly more economical and that the amount expended, considering the time and distance traveled over country roads, to be low. Will Motor Age inform me whether I am right or wrong?—A. B. Hallock.

If you have obtained 5,000 miles' service with \$100 upkeep, you should not look for much better results with your car. If you were to use the 31 by 4-inch size you should get practically one-third more wear, and for which you will have to pay approximately a third more for your extra sizes, so that it is questionable in the end if you will come out any better than you are receiving from the present sizes.

## AUXILIARY EXHAUST PATENTS

Richmond, Ind.—Editor Motor Age—Through the Readers' Clearing House will Motor Age inform me whether or not the auxiliary valve as used on the Franklin cars and others is patented?—A. Henry.

It is understood on good authority that the patent application is pending on the use of the auxiliary exhaust valve. Already many claims have been allowed on this patent

## EXHAUST SPRINGS HEAVIER

Clinton, Ill.—Editor Motor Age—Through the Readers' Clearing House will Motor Age inform me if the intake and exhaust valve springs on the model T Ford are the same, or are they alike as to tension and size.—E. C. W.

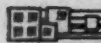
The exhaust valve springs are heavier than the intake springs and naturally have more tension.

## SNOW IN KANSAS

Kansas City, Mo.—Editor Motor Age—The pictures I am sending herewith are not of a Cook polar relief expedition, but of a country road near Kansas City which we struck on Sunday, December 26, on our way to Overland Park, where Hamilton was giving exhibitions in his Curtiss biplane.—F. E. Lott.



MOTORING IN THE SNOW IN KANSAS CITY



# Manufacturers' Communications



## SHOULD COUNT AVERAGE WEAR

**A**KRON, O.—Editor Motor Age—Car owners interested in the upkeep cost of their cars—and there are very few who are not—sometimes fail to take everything into consideration in figuring the cost of their tire service. If one tire should happen to blow out for one cause or another after, say 2,500 miles of service, the user likely is to think of that fact only. Probably he doesn't recall that one of the other tires gave 6,000 miles, the third 7,000 miles and the fourth 8,000 miles. Failing to take this into consideration, he may get a mild grouch and want to do things to the company that furnished the tires.

It is obviously impossible for all tires to meet the same road conditions. All tires will not hit the same stones; all will not run in the same rut; all will not skid in the same car track. There are countless obstructions in every mile of road, paved or otherwise, and it's plain that one tire will hit some and another tire hit others, injury resulting to one and not to the other. Bearing this point in mind, it seems a fair conclusion that tire experience should be based on the average service of all four tires and not on the service of any one tire, be it good or bad. In the illustration before given the user, whose tire blew out at 2,500 miles, had an average service of 5,875 miles when the work of his other three tires is taken into consideration.

Rear tires get much more severe work than front wheels, and the wear and tear of this is such that they can not be expected to last as long as the front casings, but they sometimes do. In view of all this the following letter written us on January 3 by F. W. Conrad, of the Pacific garage, Montesano, Wash., contains some remarkable facts: "This is to notify you that I used a six-cylinder, seven-passenger Franklin car last year, and drove same on a set of your tires. Here is a list showing the exact mileage of the tires:

Left front .....	9,420 miles
Right front .....	9,348 miles
Right rear .....	9,188 miles
Left rear .....	9,179 miles

"This mileage is not guess work, but actual speedometer reading." It will be noted that the mileage of the poorest tire was only 241 miles lower than that of the highest, and the average for all tires was 9,281¼ miles. Undoubtedly Mr. Conrad drove his car carefully and conservatively—no sudden throwing on of brakes, no skidding around corners. He may have—as many do—shifted the back and front pairs at the proper time and thus have gotten extended service. In this connection care must be exercised not to make the change

after either set is too much worn. And he also, probably, saw to it that all of his tires were kept pumped up hard all of the time; pumped up hard enough to stand full and round under a maximum load—a point very essential in getting maximum mileage.—Diamond Rubber Co.

## TIRE COUNT AT DETROIT

Akron, O.—Editor Motor Age—A census, carefully compiled of the cars at the opening night of the Detroit show, showed fourteen makes of tires represented on 163 pleasure vehicles. As was the case at the Madison Square garden show, the Goodrich had the lead. There were thirty-nine vehicles outfitted with these tires. The nearest competitor, the Diamond, had twenty-two; Morgan & Wright, eighteen; Goodyear, sixteen; Michelin, sixteen; Ajax, twelve; G & J, nine; Firestone, eight; Empire, seven; Hartford, six; Fisk, four; Pennsylvania, four; Kelley, one, and Federal, one. At the opening of the garden show the Goodrich tire was found on fifty-six vehicles, while its nearest competitor had forty cars outfitted. As an interesting comparison, Madison Square garden had 190 pleasure vehicles at the opening of the show, while Detroit had 163. Among the electrical vehicles at the Detroit show, seven were fitted with Palmer web tires, a product of the B. F. Goodrich Co.—B. F. Goodrich Co.

## BALL-BEARING CRANKSHAFTS

New York—Editor Motor Age—In a recent issue of Motor Age Fred Sombert has asked for information regarding the use of ball bearings on the crankshaft. Motor Age, in reply to this query, sums up the situation just about as it exists, but there was one point which was not very clearly brought out, but which has an important bearing on the facts. Motor Age states that ball bearings are at present giving success on some makes of cars, whereas other manufacturers after using them for several seasons have discarded them. I do not know of a single case where an American manufacturer who has used ball bearings on the crankshaft ever discontinued their use. Some 3 or 4 years ago two prominent foreign manufacturers attempted to use ball bearings on the crankshaft, but the bearings were small, the crankshaft not properly strengthened, and the experiment was a failure and hastily abandoned. The American designers who adopted ball-bearing crankshafts



employed bearings with the proper factor of safety and a strengthened crankshaft, which anyone who will give the subject thought certainly will realize is necessary, with the result that the ball bearings of the crankshaft are just as successful as ball bearings in the transmission and other parts of the car. The ball-bearing crankshaft has been a feature of the Lozier car for over 2 years past and we do not recall an instance of a motor having given a moment's trouble to a single user. Through this feature of construction the fact that the lubrication of crankshaft ball bearings is reduced to a matter of great simplicity and by the fact that it never is necessary to adjust the crankshaft bearing during the season and granting the durability of the bearing there can, in our opinion, be no doubt as to the desirability of this style of bearing, aside from its greater cost. We believe that our experience is the experience of other manufacturers using ball bearing crankshaft, and we long ago placed our verdict on record with the prediction that no car claiming to be of high grade and quality can in the future be successfully marketed with a plain bearing motor, and every year's experience with this construction only serves to confirm us in our belief in the ultimate fulfillment of this prediction.—C. A. Emise, Lozier Motor Car Co.

The concerns Motor Age had in mind as abandoning ball bearings on the crankshaft were the companies manufacturing the Stevens-Duryea and National.

## ON ITS FEET AGAIN

Racine, Wis.—Editor Motor Age—As a result of the recent loss of one of our factory buildings by fire, reports concerning our present conditions reach us from time to time that are incorrect and, therefore, misleading. Although it is but 6 weeks since one of our large factory buildings was destroyed, we have resumed operations in practically the same proportions as before and are now delivering finished product to our patrons. While it is true that many attractive offers were made us to establish elsewhere, we have not seriously considered doing so, and it may be definitely stated that we will continue at the same location in this city. Since the fire, we have equipped a new factory building which was completed just prior to the fire. We have it equipped with entirely new and modern machinery and is now in full operation, as is also our factory No. 2, which was not destroyed. In a very short period of time we will operate on even a larger scale than at any time in our past history.—Racine Mfg. Co.





# Legal Lights and Side Lights



## JURY SHOULD DECIDE

IN a recent Massachusetts case, Donahue vs. Witherill, 89 Northwestern Reporter 793, the plaintiff agreed to purchase a motor car of defendant for \$1,040. A payment down of \$25 was made and payments of similar amount were to be made monthly for several months, and the balance then remaining was to be paid on the delivery of the car. The payments prior to delivery were made and then a dispute arose between plaintiff and defendant as to how much was remaining yet to be paid. The plaintiff put in evidence showing tender of payment by him of the amount which he claimed was due, and at the conclusion of this evidence the defendant stated that he did not care to put in any evidence, and asked the court to instruct the jury for the defendant. The court refused to do this, but instructed the jury to find for the plaintiff. On appeal the supreme court held that this was error and that the evidence should have been submitted to the jury, which could have found a verdict for one of the parties therefrom.

## PROTECTS CAREFUL DRIVER

The supreme court of Virginia has in a recent case made a ruling which again assures the careful driver of a motor car immunity from liability for damages caused by a fractious shying horse, when the exercise of reasonable care on the part of the motor car driver could not have prevented the accident. The case was Daughner vs. Harmon, 66 Southeastern Reporter (Virginia) 86.

The court said: "The essential charges in the declaration are that the plaintiff was standing in front of a horse, holding it by the rein, with which the animal was being hitched to a buckboard by the owner and an assistant on Central avenue in the city of Staunton; that the defendant came along the avenue in a motor car, at sight of which the animal, being in plain view of the defendant, gave evidences of fright, and it was apparent that it was liable to run away and injure the plaintiff; that thereupon one of the men who was engaged in hitching the horse to the buckboard waved his hand in the direction of the defendant as an indication of danger, and it became the duty of the defendant to stop his car; yet the defendant, well knowing the plaintiff's danger, continued to advance, whereupon the horse became uncontrollable and plunged forward, knocking the plaintiff down and pulling the vehicle over him, and inflicting the injuries of which he complains."

On this declaration there was a judgment for the plaintiff in the lower court and an appeal was taken. The supreme court of appeals reversed the decision.

"The evidence tends to show," says Judge Whittle in the course of his opinion, "that Central avenue is one of the main thoroughfares of the city of Staunton, and that the accident occurred on court day, when it was thronged with travelers and vehicles. That the defendant in company with his friend Miller was running his machine in a careful manner, and at a rate of speed estimated at from 4 to 6 miles an hour—well within the speed limit fixed by law—and was keeping a lookout to avoid accidents. That he did not discover the fright of the horse until he was in the act of passing it. That the animal was at that time shying, but was being held by two men, and did not seem uncontrollable until after the motor car had gone by. That neither the defendant nor his companion saw the man wave his hand as a cautionary signal. That Miller observed that the horse gave indications of shying when they had approached to within a little less than the width of the courtroom from it, but the animal did not at that time manifest severe fright. That the horse was shown to be motor car shy, but that fact was not known to the defendant at the time of the accident. Moreover, the evidence we think plainly shows that the defendant was not aware of the plaintiff's danger until his machine had reached a point opposite it, or had passed the horse's head, and that, even if he had discovered the animal's fright earlier, he would have seen that it was in charge of three able-bodied men, and that there was nothing in its behavior to lead one to suppose that it would become unmanageable."

The court then takes up another alleged ground of negligence, namely, that the motor car driver should have stopped his machine immediately upon noticing the fright of the horse, and upon this point concludes that it was fully as reasonable to presume that it would have scared the horse more to have stopped the car at a point just opposite it, than to have driven on as defendant did. The court concludes:

"At all events the emergency which confronted the defendant was not of his own making, but was occasioned by the imprudence of the plaintiff and his companions in undertaking to hitch an animal, whose dangerous character was well known to them, to a buckboard in a crowded street, when it appeared that there were several hitching lots in the immediate vicinity."

"In the interest of public safety we



fully appreciate the importance of a rigid enforcement of the law against the negligent operation of motor cars over the highways of the commonwealth. At the same time such consideration can afford no justification for mulcting the owners or drivers of such machines, either with damages or fines for inevitable accidents not due to their fault or negligence, yet to the happening of which they may have incidentally contributed."

## RIGHTS OF PEDESTRIANS

A point of road law was brought up in Apperson vs. Lazro, 88 N. E. (Ind.) 99, in which it was contended that the motor car driver did not leave the left side of the road and turn to the right in order to avoid collision with an approaching pedestrian; and that since if a turn was to be made at all it would have to be made to the right, the law required no turn to be made, and the motorist had a right to drive straight ahead irrespective of the danger to the pedestrian. The court ruled otherwise, holding that such a contention would leave the pedestrian without protection of any kind from owners of motor cars or vehicles. "The rights of pedestrians and vehicles upon the highway are equal, and drivers are required to exercise such care and prudence as the circumstances demand—care in proportion to the danger or the risks in each case," he said.

## OHIO'S LATEST BILL

Representative H. J. Ritter, of the house of representatives of Ohio, has announced the following schedule of fees which are included in his bill which will be presented to the Ohio general assembly in a few weeks: 20-horsepower cars, \$5; between 20 and 40 horsepower, \$10; for 40 horsepower and over, \$15. A new feature of the Ritter bill will be to include motor cycles under the state law and each will be registered for a fee of \$5. The law will be strenuously opposed from all parts of the state and many of the members of the general assembly will be opposed on the ground that the proposed grading of fees will make the whole law unconstitutional.

## CAN RACE ON HIGHWAY

Under the statutes of the state of New York the local authorities may, for a certain time, set aside a highway or part thereof for speed tests or races for motor cars under proper restrictions, and the state engineer has no authority to promulgate rules under which races are to be run and to prevent races until these rules are complied with, as the authority to permit such use of the highways is in the local authorities. So says a decision in the case of Morrell vs. Skene, 119 New York Supplement, 28.

# CHICAGO SHOW ISSUE

## STARTING A SIX-CYLINDER ON COMPRESSION

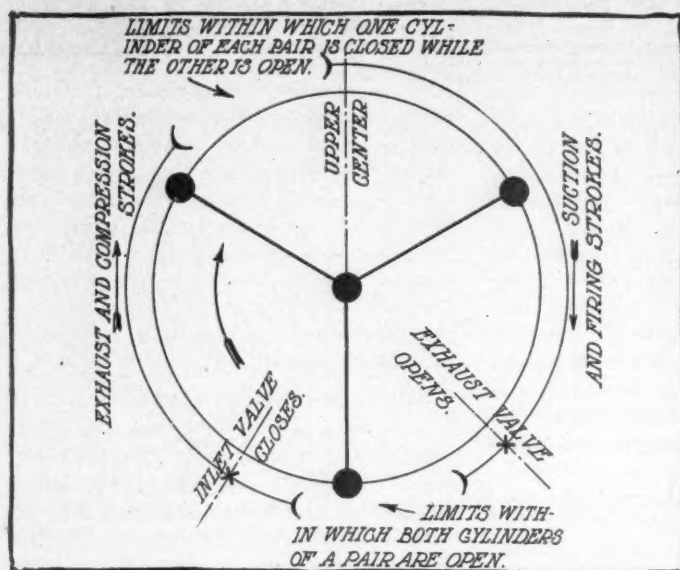


FIG. 1—DIAGRAM SHOWING RELATIVE POSITIONS OF PISTONS

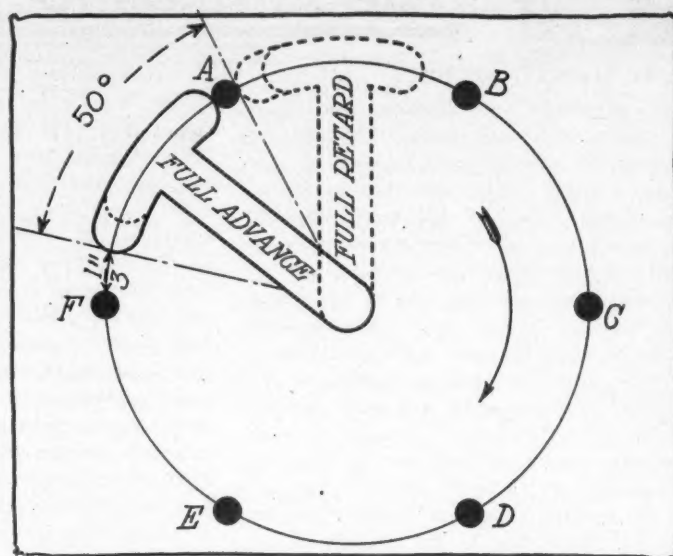


FIG. 2—DIAGRAM SHOWING RELATIVE DISTRIBUTER POSITIONS

IN THE article by the writer which appeared in the December 16 issue of *Motor Age*, the four-cylinder engine only was discussed in detail. It now appears that the article was not explicit enough for the owners of six-cylinder cars and therefore the same line of reasoning is carried out for them.

As in the preceding article, let the position in which the cranks are most liable to rest in stopping be determined. Remembering that the explosions follow at regular intervals and that there are three of them per revolution, it is evident that the cranks must be 120 degrees apart. This alone—since three such intervals brings us back to the starting point or position of the first crank—is sufficient reason for stating that the cranks must be arranged in pairs or that the pistons travel in pairs. This discussion is limited to the four-cycle engine. For mechanical reasons and that the engine may be as nearly balanced as possible, it is customary to have the two center cranks together, the two end cranks for the second pair and the remaining intermediate cranks for the third. As indicated in Fig. 1, a little thought will show that while one crank is on the firing stroke its mate is on the suction stroke; and while on the exhaust stroke, its mate is on the compression stroke. This holds true for any cylinder and it will be seen that with the exception of a short time during which any pair of cranks is near the lower center, the valves of one corresponding cylinder are both closed while with the second cylinder of the pair it is open to the atmosphere either through the inlet or exhaust valve, and therefore its contents are at practically no pressure.

We can consequently disregard the three cylinders which are under no pressure and consider that, so far as the position of stopping or equilibrium is concerned,

By M. R. Wells

we have a three-cylinder engine, all of whose cylinders are practically full of gas and closed up tight. This compression in each will therefore increase as its piston nears the top and decrease again as it recedes. Also, when any two pistons are at the same level, the pressures within the corresponding cylinders will be practically equal. This last condition can only occur when the third crank is in one of two positions, either at the top or bottom center where any pressure in its cylinder can have no effect in turning the engine. It is highly improbable that a piston will stop at the upper center where the compression is greatest, and we are consequently safe in assuming that the engine will come to rest with one pair of cranks at the lower center, while the other two pairs are equal distances to either side of the top center, in other words, 60 degrees. If the engine does not come to rest in this position it would seem that there must either be considerable friction in the engine or else unequal compression in the various cylinders.

With the engine stopped in the position assumed, and all cylinders full of an explosive mixture, it is evident that if a spark is sent to the cylinder whose crank is 60 degrees past center and a sufficiently strong explosion results, the engine will be started in the proper direction and the cycles will continue in their regular order.

Let us stop long enough to consider what is required of the ignition outfit. Assuming a maximum advance of 60 degrees where coils with vibrators are used and 40 degrees where a magneto is used, it will be seen that in order to care for the full advance as well as the retard of 60 degrees, the range on the crankshaft must be 120 and 100 degrees respectively.

This means 60 or 50 degrees on the distributor or timer. It is not uncommon to see the segments of times of such length that the contact is continued for as much as 25 or 30 degrees on the timer, hence the time case need only be the difference or  $60 - 30 = 30$  degrees. There should be little trouble in obtaining this movement.

If a distributor is used, and the terminals be placed on a circle of 2 inches radius, the sector can be made, Fig. 2, to remain in actual contact with any one terminal during the full range of 50 degrees—100 on the crank—and yet maintain a gap approximately  $\frac{1}{8}$ -inch between the sector and the adjacent terminal. This seems to be a fairly safe gap, but if with the ignition fully advanced, it is found that the spark jumps to the wrong terminal, the trailing end of the sector can be shortened as much as  $\frac{1}{4}$ -inch, as shown dotted, and yet the spark will probably jump to the terminal A when the sector is in the full retard position, because the gap A is still less than that to B. It is easy enough to tell whether the distributor is doing its part by removing a terminal or spark plug and then watching to see whether the spark actually goes to the proper plug throughout the given range. If it does not go to the proper plug, next determine whether it is going to any other, thus indicating whether the trouble is due to a lack of spark or proper distributing of same.

Assuming that the matter of getting a spark at the proper place and time is well enough understood, let us consider what is required of the first explosion in a six-cylinder engine, as compared with that in a four-cylinder.

First, we see that if the charge left in the cylinders when the engine stopped gradually leaks out until the pressure becomes atmospheric, the amount of explosive mixture left in the cylinder of



the six-cylinder engine—same size cylinders are assumed in each case—will be less than in the four, since the pistons come to rest higher up in the cylinders of the former.

Second, with a heavier crankshaft, probably the same weight flywheel and with six pistons and connecting rods instead of four, it is evident that there is more inertia to be overcome in starting the six.

Third, where it was shown in the case of the four-cylinder engine, that the first explosion had to turn the engine over approximately one-quarter revolution before the following piston began its working stroke, with the six only one-sixth revolution is required.

Fourth, the resistance offered by the cylinders on their compression strokes is apparently slightly less in the case of the six than in that of the four, for the following reasons: Assuming as we did that the pressure in all cylinders had leaked down to atmospheric before an attempt is made to start, it will be seen that the charge contained in the cylinder to fire second is smaller than would be the case with the four-cylinder, hence the compression pressures are less. At the same time, the effective radius at which the resultant pressure acts is less because the crank and connecting rod are more nearly in the same line. Since the inlet valve is generally left open until approximately 30 degrees after the lower center, the cylinder whose crank stopped on the lower dead center will hardly begin to compress until after the first 30 degrees, and for the next 30 degrees the compression will be so slight that its resistance can be neglected.

From the above it would seem that the chances for starting a six-cylinder engine on the spark are fewer than for a four, even on the assumption that the valves and piston rings are in pretty good condition. Mention should be made of the fact that a six-cylinder engine with a given size cylinder does not require as heavy a flywheel as a four-cylinder engine. This is true, but some makers of both fours and sixes prefer for commercial reasons to use the same wheel on both. If this be not the case, however, and the inertia of the revolving parts of the six are actually made lighter than in the four, then the advantage of the four over the six is considerably reduced.

In case the compression in one cylinder

is greater than another, or that one charge be lost through leakage faster than another, it is evident that the engine would no longer come to rest in the position assumed above, but might stop either side of it. If the piston in the cylinder first to fire, stops farther down on its stroke, the contents of the cylinder would be greater and the first explosion would have a better chance of carrying the engine over the following center and even though the second explosion would be weaker the chances of a successful start would be greater. On the other hand, if the piston of the cylinder first to fire happened to stop closed to top center, the chance of the first explosion, starting the engine would be greatly reduced.

## Making Millimeters Into Inches

By Frank H. Trego

Foreign cars are becoming more of a factor in this country so the question of the French measurement frequently arises and one encounters the necessity of converting millimeters to inches and inches to millimeters. By the use of the chart shown, Fig. 1, the process is extremely simple and becomes simply a matter of inspection of the chart.

Example: We have a French motor 130 by 140 millimeters. What size is it in inches?

Solution: Find the 130 along the top where are found all the millimeters. Follow down along this line until the intersection of the diagonal is reached and then follow

the horizontal line to the left and reach the first line below the figure 5 on the left margin, which would be read as 5.1 inches. Following down from 140 millimeters likewise, the diagonal is met; follow to the left, arriving at the fifth line below the figure 5, which would be read as 5.5 inches. The size of the motor is 5.1 by 5.5 inches.

The process of reducing inches to millimeters is opposite to the above and one should start at the left margin, follow to the right until the diagonal is met and then follow straight up to the millimeter scale and read in millimeters and tenths. If the inches are to be read in quarters, etc., instead of tenths, then we read by means of the dotted lines instead of the unbroken lines at the left; reading  $5\frac{1}{4}$  instead of 5.25, etc.

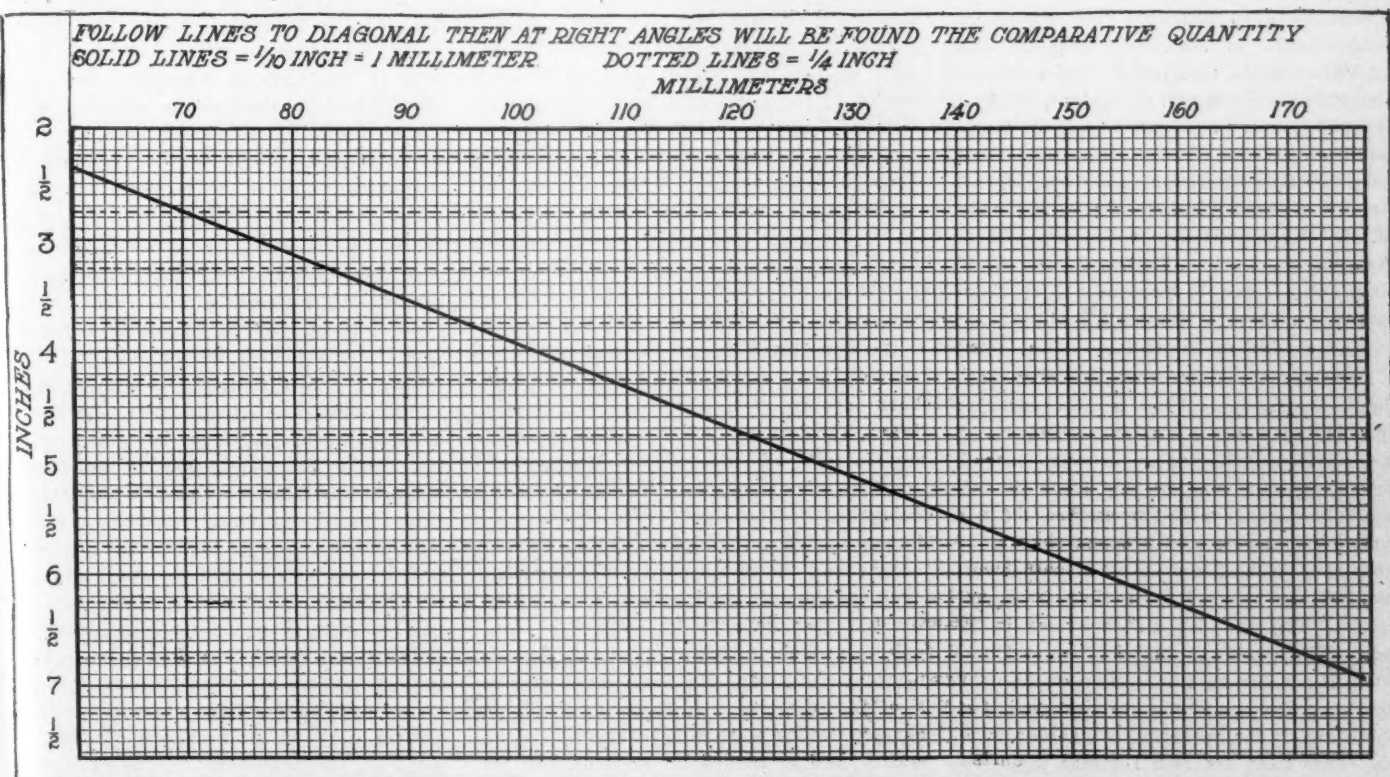


FIG. 1—CHART SHOWING EASY WAY OF CHANGING MILLIMETERS INTO INCHES



# From the Four Winds



**New Chairmen Chosen**—The following committee chairmen for the Seattle Automobile Club have been announced for the coming year: Membership, N. H. Latimer; legislative, Alfred Battle; roads, John P. Hartman; entertainment, M. Robert Gugenheim.

**R. H. Johnston Married**—R. H. Johnston, advertising manager of the White Co., went to Boston last week quietly and was married there Wednesday night to Miss Marion Stiles, a Brookline girl. They left immediately afterward on their honeymoon, and will be at Chicago during the motor show there.

**Wants Flying Squadron**—The fire department of Hartford, Conn., wants a flying squadron to take the place of the combination chemical horse-drawn wagon now at headquarters in the heart of the city. The board of fire commissioners, in making up the budget for the ensuing year, added \$5,000 for the cost of the proposed wagon. A Pope-Hartford is what the commissioners have in mind.

**Kick About Motor Signals**—The prevalence of weird-sounding motor signals has wakened the Automobile Club of Philadelphia to the fact that the law is being disregarded in this particular. It has therefore called the attention of the authorities to the fact that the ordinance of June 18, 1906, forbids the use of any motor signaling device except the common French horn sounding but one note.

**Century Club Election**—The recent annual election of the Century Motor Club of Philadelphia resulted in the choice of the following officers: President, J. Fred Hartman; vice-president, Frank R. Isaac; secretary, C. D. Holden; treasurer, F. R. Davis; board of directors, Edwin M. Abbott, J. Howard Clarke, Edward H. Ervin, H. G. Evans, Henry Goldthorp, Ralph Humphreys, Lucien V. Leach, Dr. C. F. Rau, Dr. Clayton S. Schwenk, C. B. Sears and R. N. Storey. Edwin M. Abbott was elected counsel of the club.

**Pennsylvania Law Now Effective**—The Pennsylvania motor law is now effective and includes some radical changes. A straight fee of \$3 per car is now charged. Every machine must be registered according to horsepower; \$5 for each car of less than 20 horsepower, \$10 each for cars of more than 20 and less than 50 horsepower, and \$15 for cars of more than 50 horsepower. The fee for motor cycles is \$2 each. The chauffeur must be licensed and must pay a fee of \$2. A fine of \$1 or 1 year imprisonment can be imposed for joy-riding or for operating a machine with any other than its own register tag. To drive while intoxicated courts a fine of from \$1 to \$3 or imprisonment of 1 year,

or both. Fines for exceeding speed limit or running a car without a registration tag, or with an unlicensed chauffeur, are: First offense, \$10 to \$25 or 10 days in jail; second offense, \$25 to \$50 or 20 days in jail; third offense, \$50 to \$200 and 30 days in jail.

**Charged With Stealing Cars**—Brynjulf Vederler, a magazine agent, sentenced to 45 days in the house of correction at La Crosse, Wis., for obtaining money under false pretenses, was re-arrested as he left prison last week and taken to Minneapolis to answer to the charge of stealing fifteen motor cars during the fall and winter of 1909. Vederler is 19 years old and is believed to have been responsible for the numerous thefts and consequent joy rides at Minneapolis late last year.

**Investigating Odenbrett's Case**—The coroner of Milwaukee county late last week resumed the inquest in the matter of the death of George L. Odenbrett, member of the Bates-Odenbrett Automobile Co., of Milwaukee, who was killed early last November by the explosion of a recharging tank. The investigation was halted to obtain further information, and just as it was to be resumed requests came from a Chicago concern demanding that the blame be placed by a verdict. Testimony was heard until Saturday and a decision is expected in a few days.

**Would Not Charge Visitors**—Representative Walter Edge, of Atlantic City, has introduced a bill into the state legislature of New Jersey providing for the repeal of the law requiring a registration fee of \$1 for motor cars from other states. Colonel Edge says that the law makes it bad for the Jersey motorist who travels through other states. Members from the agricultural sections, however, do not favor the Edge measure, averring that the fees now charged foreign motorists are necessary to pay the expense of keeping the roads in condition.

**Garrett Heard From**—Several bills concerning good roads and motor cars have been introduced in the Maryland legislature. The latest is one by ex-Mayor John A. Garrett, of Glen Echo, Montgomery county, now a member of the house of delegates, calling upon Attorney General Straus to define the rights of Montgomery county and the municipality of Glen Echo over the conduit road, which is controlled by the war department. He said that opinions of the adjutant general's department of the army, the department of justice and the state's attorney of Montgomery county were all at variance in the matter, and he wished the state authorities to take it up. He said that he would also ask that the attorney general should be-

gin an action to establish the jurisdiction of the state of Maryland over the conduit road. Senator Linthicum has introduced the Swann motor vehicle bill and the bill providing for sign posts along important thoroughfares of the state in the state senate.

**Prepare for Giant's Despair**—Residents of Wilkes-Barre, Pa., already have contributed over \$3,000 toward insuring a renewal of the annual hill-climb there next summer. The date assigned for the climb this year is June 11, and with no other event to conflict with it, the affair this year promises to take on more of a national aspect than ever before.

**Ohio Getting Strict**—Ohio cities are going to put a stop to owners driving cars in the state without the proper 1910 number plates. Orders have been issued to the police departments of Dayton and Cincinnati that all violators of the state law shall be arrested after February 1. Director McCune, of the department of safety of Columbus, has ordered that all violators in Columbus shall be arrested after February 10, when the police department will start to enforce the vehicle license on horse-drawn vehicles.

**Want a Ruling**—The Ohio motor car department has requested Attorney General Denman to render an opinion on the question if motor cars owned and operated by municipalities must be registered and tagged. When Columbus purchased a motor car for the chief of the fire department, Secretary of State Thompson ruled that it need not be registered, but since that time the matter has assumed other proportions. These municipal cars are frequently used outside of the city and the drivers are apt to be reckless and there is no means of identification in case of accidents. A ruling is expected soon.

**Makes Editors Club Members**—Appreciating the valuable services rendered by the newspaper men of Lancaster county in their campaign for better country roads during the past year, the Lancaster Automobile club has unanimously elected to honorary membership in the club each of the thirty newspaper editors within the domains of Lancaster county. The Lancaster club has been very active in assisting road supervisors and farmers in general to apply the split-log road drag on their country dirt roads in muddy weather and has been instrumental in securing the distribution throughout Lancaster county among farmers of about 300 road drags. Supervisors have been taking up this method of road maintenance officially in many of the townships due to the active support given editorially by the newspapers of the county. The Lancaster club's



activities also against negligent and defiant road supervisors who neglected to comply with the laws in removing loose stone and in directing signboards at all cross roads have been well known. The club at the last term of court prosecuting four townships out of the county's forty for non-compliance with this statute.

**Price of Horses Increases**—In spite of the greatly increased use of the motor car, the self-propelling vehicle has been unable to depress either in number or value its rival, the American horse. With motor cars coming into common use, the price of horses rose from an average of \$95.64 in 1908 to \$108.19 a head in 1909. In numbers the horses of the United States increased from 20,640,000 to 21,040,000.

**Oldfield Buys Big Benz**—Barney Oldfield has purchased the new German Benz racing car which Hemery drove at world's record speed over the Brooklands track in England. Jesse Froehlich, managing director of the Benz Auto Import Co., announced last week that he had sold the car to Oldfield and that in the future Barney would have entire charge of the record-breaker. Since the car reached this country some weeks ago there have been various rumors afloat concerning the probable pilot of which is claimed to be the fastest machine on wheels.

**Seattle Dealers Elect**—The Seattle Trade Dealers' Association, of Seattle, Wash., was reorganized during the past week, the following officers being elected: H. P. Grant, of the Seattle Automobile Club, president; R. P. Rice, Seattle manager of the Ford Motor Car Co., vice-president; H. C. Fenn, of the Overland Automobile Co., treasurer; Fred Haines, Seattle agent for the Pierce-Arrow, secretary. These officers, with W. D. Wallace, manager of the Olympic Motor Car Co., and E. J. Streslau, manager of the Motor Equipment Co., comprise the board of directors who will actively direct the affairs of the association.

**What It Means**—While great interest is being taken by the east and middle west, as well as the coast, in the new board track in southern California, which opens April 8, comparatively few people have stopped to consider that this will be the largest single wooden structure of any sort ever built in America. When one pauses to think that an order for 3,000,000 feet of prime Oregon pine planks and beams was placed, a large portion of which is now being carted in great loads, and that to hold it all together no fewer than 200,000 pounds of nails and spikes and a few tons of bolts are also being shipped to the grounds at Playa De Ray, it will be noted that this mile-lap, 75-foot wide, 25-foot banked Los Angeles motordrome is a genuine eye-opener. The surfacing planks are 2 by 4's, 16 feet long, while the underpinning is of various dimensions, and Jack Prince, who is in charge of the construction work, declares it is being built strong enough to

stand the weight of an express train. This means that the saucer will be vibrationless and that no matter how closely cars may cluster together while running, their combined weight will not in the slightest degree strain the track at any point.

**Pennsylvania Registrations**—The registrations of motor cars at the state highway department in Harrisburg, Pa., has already reached the 10,000 mark, the majority of the cars registered exceeding 20-horsepower. Over 6,500 chauffeurs' licenses have been issued up to date.

**Want Universal Lights**—Motor car owners at Fond du Lac, Wis., are planning a campaign to make it obligatory for all horse-drawn vehicles to carry front and rear lights at night. Several accidents unavoidable on the part of motorists have occurred recently. It is believed to be discrimination to require a motorist to carry lights while the horseman need not.

**Fixes Taxicab Rates**—The state sealer of weights and measures for Massachusetts created quite a stir in taxicab circles in Boston a few days ago by stating that as a result of tests he had found that a large number of meters were not registering correctly. For a time the taxicab men were in a quandary, but the matter has been straightened out by Police Commissioner O'Meara, who changed the ordinance covering taxicab rates so that the users are not to pay for the first 6 minutes of waiting. This allows for the difference between the meters and the wait allowed for 30 cents, the first period.

**Another Wisconsin Club**—The Rusk County Automobile Club has been organized with headquarters at Ladysmith, Wis., and will doubtless affiliate with the Wisconsin State Automobile Association. E. M. Worden, of Ladysmith, was elected president and the other officers are: T. M. Thomas, secretary; H. W. True, treasurer. The club aims to pay attention to the subject of good roads, the rights of the traveling public both in horse-drawn and self-propelled vehicles and entertainment of visitors. Ladysmith is the county seat of one of the northernmost counties in Wisconsin, which is rapidly developing as a motor car user.

**New York-Boston Scheme**—Thomas F. Moore went to Boston last week to talk over plans for a contest between New York and Boston during the motor show in the latter city. He had a new scheme of picking out the winner by popular ballot, the readers of the papers to do the voting. While there may be some sort of a run, it will not be a race, for the recent law that went into effect in Massachusetts would check it. It was suggested to have a run whereby the motorists were to go it without knowing what the schedule was to be, having Mayor Gaynor figure out one that would keep within the law, and so the winner could be announced when the schedule was opened in Boston in the presence

of the contestants the evening of the run. This plan may be followed out. L. H. Pearlman of New York is willing to put up a trophy valued at \$500 for the run.

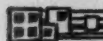
**May Hold Another Run**—There is much talk within the past few days of the proposed midwinter endurance run from Hartford to Pittsfield, Mass., to Springfield to Hartford.

**Portland Holds Show**—Fully 2,500 persons visited the second annual Portland show, which opened Monday, January 24, and witnessed the most complete exposition of motordom ever held in the far west. Fifty cars were sold the opening night before 10 o'clock.

**Chauffeurs Will Help**—At a meeting of the Minneapolis Motor Drivers' Club, it was decided that Minneapolis chauffeurs would co-operate with the police in the strict observance of state and city speed regulations and vice versa. Chief of Police Corrison was present at the meeting and outlined his position as regards the interpretation of the local ordinance. Members of the organization promised to carry out his ideas in order that less danger to pedestrians may result. The suggestion was also made that Nicollet avenue, the principal business street of Minneapolis, should be cleared of heavy vehicles and be made as much a boulevard as possible.

**Prize for Road Supervisors**—As the result of a midwinter motor trip, Carl G. Fisher, of Indianapolis, has offered a 1910 motor car to the road supervisor whose road is in the best condition between Logansport, Ind., and St. Joe, Mich., on July 1. The award is to be made by a committee composed of county commissioners and newspaper men. The roads between Indianapolis and Logansport are in good condition, while Mr. Fisher found those between the latter city and St. Joe were not so good. Mr. Fisher is president of the Indianapolis Motor Speedway Co. and is identified with the Fisher Automobile Co., Prest-O-Lite Co. and Empire Motor Car Co.

**Kills Milwaukee Wheel Tax**—The Milwaukee common council committee on judiciary has effectively killed the Stern wheel tax ordinance, pending for some time, by recommending indefinite postponement, which has been agreed to by the council. The measure provided for a special tax on all vehicles, including horse-drawn and self-propelled, to raise money for street improvement. The Milwaukee Automobile Club took a decided stand against the measure and its efforts were successful. The argument of Counsel James T. Drought, of the M. A. C., was that the motor car owners are paying a fair share of taxes in their registration fee and personal property assessments; that the special tax would be double taxation, and that the measure would mean discrimination.



## AMONG the MAKERS



BROAD AND COMPREHENSIVE VIEWS OF THE ENORMOUS PLANTS OF THE EVERITT-METZGER-FLANDERS CO., IN DETROIT.

**Is Overland Agent**—The Mich-Stair Auto Co. last week secured the agency in Minneapolis for the Overland.

**Will Sell the Ford**—The Bejier & Finch Motor Car Co. has been formed at Stevens Point, Wis., to handle the Ford in Portage, Wood and Waupaca counties, Wisconsin. H. J. Finch, an insurance agent of Stevens Point, and Arthur H. Bejier, of Phillips, are the proprietors.

**Reid Gets Warren-Detroit**—Harry F. Reid, of Minneapolis, has closed for the agency of Warren-Detroit cars to be represented in the northwest for the first time. The name of the concern is the Warren Auto Co. Temporary headquarters have been taken at 522 Tenth street south.

**Making Many Bodies**—The Racine Mfg. Co., of Racine, Wis., is now turning out a large percentage of bodies as before the fire in December. Temporary dry kilns have been erected on the site of the old plant and these will be removed when building operations begin in spring. Every available building in Racine is being used by the company and new machinery is arriving daily.

**New Head Needed**—At a recent meeting of the New York Automobile Trade Association, General John T. Cutting resigned as president of that organization, to take effect February 15. The act is due to the formation of the licensed dealers' association, of which General Cutting is a member, and on account of business pressure he could not devote his time to both organizations.

**New Croxton-Keeton Agencies**—O. P. Bernhart, vice-president of the Croxton-Keeton Motor Co., has appointed the following new agencies: Overland Automobile Sales Co., Dallas, Texas; Tri-State Auto and Supply Co., Los Angeles, Cal.; Northwestern Stearns Co., Duluth, Minn.; Bergdoll-Hall Motor Car Co., Philadelphia; Central Garage Co., Winnipeg, Can. Croxton-Keeton taxicabs have been placed in service by the Taxicab Service Co. of Detroit, and the Walden W. Shaw Co., of

Kansas City, Mo., while the Zunstein Liv-  
ery Co., of Cincinnati, has added ten of  
these cars to its fleet.

**Gets an Omaha Job**—H. H. McDonald, formerly with the St. Louis Motor Car Co., has gone to Omaha as sales manager of the the new Standard Automobile Co.

**Mitchell's Big Dining Hall**—The Mitchell-Lewis Motor Co., of Racine, Wis., has established a large dining room in the new general office building, where employees may obtain meals at cost. It is for all employees.

**Building New Store**—The building at present occupied by the Gordon Motor Co., of Richmond, Va., has proven inadequate to meet its requirements and it has purchased a lot on West Broad street, near Harrison, with a frontage of 100 feet and a depth of 130 feet, on which it will have erected a modern garage and sales room 100 by 130 feet, two stories high, estimated cost of lot and building to be \$50,000. The main floor will be for live storage exclusively.

**New Quaker Agencies**—The glamour of show week brought about its usual influx of branches and new agencies in Philadelphia. The most prominent deal in this line was the establishment of the Krit Sales Co. at 203-205 North Broad street, with W. D. Shepherd as president and T. W. Pritchard as secretary-treasurer, which will act as distributor for the Krit car in eastern Pennsylvania, southern New Jersey and Delaware. A similar deal was the placing with the Automobile Repair and Sales Co., 911-15 North Broad street, the agency of the Michigan six for southern New Jersey, Montgomery, Bucks, Delaware and Chester counties, Pennsylvania. Henri Petri, 308-16 South Camac street, has acquired the local agency for the Black Crow line. The Fiat agency has just opened in its new building at 323-327 North Broad street. The local Stanley steamer agent, Walter Harper, has taken on the Allen-Kingston and the Pierce of Racine, which he closed with in time to display at the

show. He also acquired the local sales rights of the Mercedes. He is looking for a row location.

**Branches Out**—The Goshen Buggy Top Co., of Goshen, Ind., has decided to manufacture motor car tops, and with that object in view has installed machinery for that purpose and has increased its force of workmen.

**Marshfield's Latest**—Orrin Hughes, of Marshfield, Wis., will erect a large garage, 52 by 88 feet, in the spring. The building will be two stories high, of brick and concrete construction, strictly fireproof. Mr. Hughes is district representative for the E-M-F and Flanders. The second floor will be used for repair shops.

**Milwaukee Incorporations**—The Obenberger Drop Forge Co. has been incorporated in Milwaukee, Wis., with a capital stock of \$30,000. John Obenberger, H. W. Ladish and H. C. Fueleuer are the incorporators. The Garage Equipment Mfg. Co., of Milwaukee, Wis., one of the largest manufacturers of motor car accessories, has been incorporated with a capital stock of \$100,000.

**Establish Truck Business**—The Reliance Truck and Garage Co., of Columbus, O., incorporated several months ago, has announced the organization as follows: Theodore Leonard, president; Andrew Timberman, vice-president; George C. Bohn, secretary, and Frank Tray, treasurer. The company will open a garage and sales agency for the Reliance trucks at the corner of Third and Lynn streets.

**Ohio Incorporations**—The Kilpatrick-French Motor Car Co., of Lebanon, O., has been incorporated by J. A. Kilpatrick, A. N. French, Albert French, Howard Ivins and C. Wilbur Ivins. The Pullman Motor Car Co., of Cleveland, was incorporated recently with a capital stock of \$25,000 by F. C. Thornton and others. The Canfield Transfer Co., of Canfield, O., was organized recently with a capital of \$50,000, to establish a motor bus and transfer business between Canfield and Youngs-



## and DEALERS



WHERE E-M-F AND FLANDERS CARS ARE MADE AND WHICH IS AN EXAMPLE OF RAPID-FIRE PROGRESS

town. The incorporators are H. W. Corll, Bertha Corll, C. H. Neff, Melvin Neff and Lola E. Mock.

**Grout's Boston Branch**—The Grout Automobile Co. opened a salesroom in the Motor Mart, Boston, Mass., February 1.

**Opens Another Branch**—The Penn Auto Supply Co., 236 North Broad street, Philadelphia, has extended its sphere of influence by the establishment of an independent concern under the title of the Penn Auto Supply Co., of Williamsport, with W. C. Price as manager. The Penn company also has a branch at Atlantic City.

**Seagrave Building Addition**—The Seagrave Mfg. Co., of Columbus, O., has completed a modern two-story fireproof addition to its plant, which will increase the floor space more than 16,000 square feet. The addition will be used to build the motors and propellers of the motor-propelled fire apparatus, which has become the most important part of the product of the concern.

**Toledo Change**—The Collingwood Auto Co. was last week incorporated at Toledo. It will take over the Collingwood garage and the business of the Olds-Oakland company. The new company will have display and sales rooms at Jefferson and Tenth streets, and a garage and repair department at the present site of the Collingwood garage. Its officers are: President, Willard E. Allen; vice-president, William C. Carr; secretary and treasurer, Rollin H. Schribner.

**Keeps Open House**—The Hokanson Automobile Co., of Madison, Wis., general western Wisconsin representatives for the Buick, Oldsmobile, White and Oakland cars, on January 26 formally opened its handsome new garage and salesroom building at 14 to 20 East Doty street by keeping open house. Each caller was presented with a souvenir. The garage is three stories high, with about 30,000 square feet of floor space. The first floor is unobstructed by posts or columns. The second

floor is devoted to the machine and repair shop, and the vulcanizing and painting department occupy the third floor.

**F. A. Hall Changes**—F. A. Hall, who for the past 12 years has been manager of the chain, block and hoist department of the Yale & Towne Mfg. Co., has resigned his position in order to accept election as vice-president and treasurer of the Cameron Engineering Co., of Brooklyn, N. Y. Mr. Hall's successor will be R. T. Hodgkins.

**Gives Taft Reo Book**—T. E. Jarrard, sales agent for the Reo, who was in Washington last week for the show, called on President Taft Saturday, and in person presented him with a copy of the souvenir brochure which has recently been issued by the Reo makers, dealing with the run made by the four-cylinder Reo in the New York-Atlanta good roads tour last November. The booklet has been dedicated to the president, as it deals with the trip made through the possum country. The president expressed his pleasure at receiving a copy of the booklet.

**Goodrich Company Plans**—At the annual stockholders' meeting of the B. F. Goodrich Co., of Akron, O., it was decided to proceed with the extensive factory additions which had been planned. Though the company makes no announcement to this effect, it is understood that almost \$1,000,000 has been appropriated for additions and betterments. Several six-story buildings similar in detail to those just completed will be erected on Falor street. At the meeting Walter A. Folger, treasurer of the company, retired from that office, being succeeded by W. A. Means. C. B. Raymond, secretary, was elected to the office of assistant treasurer in the place of Mr. Means. The other officers remain the same. B. G. Work is president; F. H. Mason, first vice-president; H. E. Raymond, second vice-president, and E. C. Shaw, general manager. The regular dividend of 2½ per cent quarterly was declared. The board of directors consists of

George T. Perkins, B. G. Work, F. H. Mason, H. E. Raymond, E. C. Shaw, C. C. Goodrich and George W. Crouse.

**Handling Standard in East**—The Standard Motor Car Co. of Massachusetts has been incorporated in Boston. It is agent in Massachusetts and Rhode Island for the Standard.

**Big Order for Buicks**—The Pence Automobile Co., of Minneapolis, started the new year by placing an order with the Buick company for 3,750 cars for the season of 1910. This is said to be the largest single order ever placed with a motor car concern, either in America or Europe.

**Receiver Named**—Glenn R. Sawyer has been named as receiver of the Industrial Automobile Co. of Elkhart, Ind. Judge Van Fleet, of the superior court, appointed Mr. Sawyer after petition had been filed by the H. Shannon Co., of Chicago, which has a claim of \$2,613 against the concern.

**Krit 1910 Product Sold**—On Saturday the Krit Motor Car Co., of Detroit, closed its final agencies for 1910. Three hundred and twenty-five cars were allotted to Cleveland, Buffalo and San Francisco. This means that the entire product of the company—1,000 cars—for the season of 1910, ending July 1, has been disposed of.

**Will Move to Cincinnati**—The Toledo Electric Welder Co., of Toledo, O., has increased its capital stock from \$30,000 to \$75,000 and will remove the factory to Cincinnati, where a lease has been taken on a two-story brick factory building, 160 by 60. Neil MacNeal is president; Walter C. Franz, vice-president, and Frank Warren, secretary and manager.

**Big Flag for Show**—The flag effect will be used in the decorations at the motor car show to be held by the Buffalo Automobile Trade Association at the Broadway Arsenal, February 14 to 19. The entire ceiling of the arsenal will be shut in by the largest United States flag in the world. The walls will be also covered with the national colors and the shield of the union.



Only American-made cars will be shown, and as far as possible only accessories made in this country will be exhibited.

**Again Moves**—The Oxford Automobile Co., Philadelphia Brush agent, has established itself in new quarters at 518 North Broad street, after having been burned out of its former store at 1615 Wellington street and being driven from its downtown establishment at 238 North Broad street by the termination of the lease.

**Starts in Indianapolis**—Mark G. Beckner, formerly with the Indiana Automobile and Carriage Co.; John Larrison and Fred W. Wiese have organized the Co Auto Motor Co., in Indianapolis. The concern has been incorporated with an authorized capitalization of \$25,000 and has leased a sales room and garage in Kentucky avenue. Arrangements have been made to handle the Jackson, Stearns and Fuller agencies.

**Janesville Interested**—A party of capitalists from Janesville, Wis., went to Chicago this week to investigate the proposition made by a motor car company, the name of which is withheld, wishing to locate in Janesville. Janesville capital was interested in the Owen-Thomas Motor Car Co., recently sold to the Corliss Motor Co., a \$1,000,000 concern formed at Corliss, Wis., and the city is anxious to obtain a similar industry. The Chicago company is said to be building commercial vehicles and sight-seeing cars.

**Grout Reorganization**—The Grout Brothers Automobile Co., of Orange, Mass., one of the early pioneers in the manufacture of motor cars, has been reorganized and succeeded by the Grout Automobile Co. The new company is strongly officered and will largely increase the output of the Grout plant. Its officers are: John W. Wheeler, president; Elisha S. Hall, treasurer; George E. Dexter, clerk. Walter J. Gould, for many years with the old company, is the general sales manager for the new company.

**Conditions in North Dakota**—R. E. Tucker, for several years Motor Age correspondent in Minneapolis and now associated with Beek & Floren, Lakota, N. D., state agent for the Reo and Velie, reports that motoring conditions in North Dakota are going to be particularly favorable the coming season. A motor show will be held at Grand Forks February 1-5, this being the first show of this kind held in North Dakota. The number of cars sold to farmers in this portion of the country, Mr. Tucker declares, is particularly large, and the farmers are making a keen study of the car at the present time. Crops last year were good, which means that there will be money for 1910 cars. Beek & Floren started in the motor business 4 years ago, selling cars as a side line, but since then they have opened four branch houses throughout the state, at Grand Forks, Lakota, Devils Lake and Minot, and are at present figuring on opening

others. They estimate that fully 800 cars will be sold through these branches and sub-agencies during the coming season.

**Shackleford Made Manager**—J. M. Shackleford has been appointed manager of the Empire Tire Co.'s up-town branch located at Seventy-third street and Broadway, New York city.

**Located at Redfield**—The Blain Automobile Co., Redfield, S. D., conducts a garage and repair shop. It has a floor space of 200 by 54 feet. Another garage is talked of in Redfield which, it is expected, will cost \$25,000 for building and equipment.

**Building a Six**—The Auto Equipment Co., 144 North Broad street, Philadelphia, began to tear down its building on February 1 preparatory to the erection of a big six-story structure on the site. The builders have contracted to so arrange matters that the company will continue its busi-

ness uninterrupted during the carrying on of the work.

**More Rainier Agencies**—Two more agencies for the Rainier were established last week. L. H. Ghaab, of Baltimore, has taken over the agency for Maryland, with headquarters at 116 West Mount Royal avenue. Mr. Ghaab has been the Stoddard-Dayton agent in Baltimore for several years. R. M. Robinson, of Albany, has closed for the agency for that city and district.

**New Columbus Models**—The Columbus Buggy Co., of Columbus, manufacturer of the Columbus electric and the Firestone-Columbus, has placed two new models on the market. One of them is a gasoline runabout with a torpedo body. The other is a two-passenger electric with a runabout body. The Columbus Buggy Co. announces



GARAGE OF BROAD-OAK AUTOMOBILE CO. AT COLUMBUS, O.

ness uninterrupted during the carrying on of the work.

**Show for Logansport**—Dealers of Logansport, Ind., are arranging for a motor car show to be held in that city this spring, probably in March. The Broadway skating rink has been arranged, and about fifty cars have been entered so far. Practically all of the Indianapolis manufacturers and several dealers of that city will exhibit. There is also to be a program of speed and novelty races.

**Chicago Happenings**—An addition to the Chicago motor colony is the Springfield agency at 1549 Michigan avenue, which has been established with Nelson Gothasall as sales manager, handling the product of the Springfield Motor Car Co., at Springfield, Ill. John J. Mitchell has become identified with the Chicago Overland branch, handling the wholesale end of the business. The Overland this week moved into its new store at 2425 Michigan avenue. Mitchell formerly was identified with Henry Nyberg. The Moline branch has

it will manufacture 100 electric and 1,500 gasoline cars during 1910.

**Another in Detroit**—The Autoparts Mfg. Co., Detroit, Mich., has been incorporated under the laws of the state of Michigan, with facilities of manufacturing parts, outside of bodies, wheels, etc. A. O. Dunk is president and general manager and Lewis A. Austin is secretary and assistant general manager. The company's specialty is rear axles, both the floating and semi-floating types.

**Omaha Dealers Moving**—Omaha dealers are pushing the construction of their new garages in an effort to have them completed by the time the show opens in February. Among these is Van Brunt's garage, which will house sixty cars, the building being 50 by 120 feet. The company will handle the Overland, Pope-Hartford and Marion cars. The Maxwell company also hopes to be in its new home in February. The new garages of the McIntyre company, the C. F. Louek company and the Omaha Automobile Co., also will



be completed by that time, and the Bergers company may get into its new home in the desired time.

**In Temporary Quarters**—Albert Smutzer and Gus Greiger, of Laporte, Ind., have secured a lease of the Hall theater building in that city. April 1 the Coliseum will be in readiness, after having been renovated, and the company will occupy space there.

**Private Show in Nashville**—Howard, Cregor & Co., of Nashville, Tenn., have been having a motor car exposition of their own the past week in their new garage on Third avenue. The show rooms were handsomely decorated and elaborately lighted and they had on exhibition several new models of the Chalmers and Hudson.

**Service Depot Ready**—The new service depot completed for the Whitten-Gilmore Co., Boston agent for the Chalmers and

that the combined capital of the two concerns is more than double that of any competitor.

**Croninger Changes**—R. Harry Croninger has resigned his position at the Pennsylvania Auto Motor Co., of Bryn Mawr, Pa., to become manager of the Providence plant of the American Locomotive Co.

**Babcock Appointment**—F. A. Babcock, president of the Babcock Electric Carriage Co., of Buffalo, recently visited Cleveland, where he appointed Robert T. Mitchell, of the Mitchell Brothers Co., general manager of the Babcock Electric Garage and Sales Co. for Cleveland and the state of Ohio. More than 200 men are busily engaged in the Babcock plant in Buffalo at present.

**New Top Concern**—The Flint Auto Top Co., of Flint, Mich., was organized and incorporated last week for the purpose of

cago, one of the large concerns in the bicycle field 10 years ago. His boyhood home was in that city.

**Ships to Coast**—The Columbus Buggy Co., of Columbus, O., recently shipped its first carload of 1910 gasoline cars to the California Auto Co., of Los Angeles, the distributing agency for southern California.

**Another Nashville Garage**—The Standard Motor Car Co., of Nashville, Tenn., F. O. Draughon, manager, has opened a garage and repair shop in Nashville at Seventh avenue and Broadway. Mr. Draughon was at one time connected with the Stearns company at Toledo.

**Mitchells for the Orient**—The first shipment of Mitchells to the Orient was made last week, when a carload of 1910 models left Racine, Wis., for Seattle, Wash., over the Chicago, Milwaukee and Puget Sound railway. At Seattle the cars will be loaded on the Puget Sound's Japan mail steamers and unloaded enroute at Manila, P. I. Many Mitchells are used in the far east.

**Fire in Rochester**—A big garage operated in Rochester, N. Y., by the Babcock Electric Garage Co., of Buffalo, was destroyed recently by fire following a gasoline explosion. Fifty-five electric motor cars were ruined. The garage was completely wrecked. The Rochester plant was used as a sales garage and was in charge of S. C. Babcock. The loss did not exceed \$50,000 and that amount was fully covered by insurance.

**Irvin Will Build**—Plans are being made by the R. J. Irvin Mfg. Co. to build a large addition to the new factory, into which it recently moved, in Indianapolis. The company manufactures tops and bodies and, although it has been in the new building only a few months, is working to full capacity. Associated with R. J. Irvin in the management of the company are Edward Sourbier, Frank L. Glover, Dr. Goethe Link and Charles Church.

**Will Have Own Show**—The Car Makers' Selling Co., selling agent for both the Anhut and the DeTamble, not being able to procure space in the Chicago show, has arranged for an exhibition of its combined lines at 1349 Michigan avenue, in the new building of the Simmons Hardware Co., directly opposite the old quarters of the Locomobile company. Harry W. Doherty, sales manager of the company, will be in charge.

**New Cole Agencies**—The Cole Motor Car Co., of Indianapolis, has arranged the following distributing agencies: Colt-Stratton Co., New York; High Point Auto Sales Co., Atlanta, Ga.; Southern Motor Sales Co., Louisville, Ky.; Cole Motor Sales Co., Savannah, Ga.; Texas Motor Sales Co., Fort Worth, Texas; Wade Motor Sales Co., Los Angeles, Cal.; Standard Automobile Co. of Illinois, Chicago; Mid-West Auto Sales Co., Omaha, Neb.; Cole Automobile Co., Minneapolis, Minn., and Monarch Motor Car Co., Kansas City, Mo.



ALVAN T. FULLER'S NEW PUBLIC SERVICE STATION IN BOSTON

Hudson cars, has just been completed and it will be occupied early in February. It is across the river in Cambridge but close enough to Harvard bridge to make it easily accessible. The building is 50 by 200 feet and there is not a post in it. The floor space is 10,000 square feet. The parts department, located at the salesrooms on Boylston street, and the repair shop on Falmouth street, will be transferred to the new building.

**Lamp Interests Merged**—An announcement is made by the Rushmore Dynamo Works, of Plainfield, N. J., and the R. E. Dietz Co., of New York city and Syracuse, that they have effected a combination to promote the sale of Rushmore lights and generators and Dietz oil lamps. The Plainfield factory, at which the gas lamps and generators will be made, will shortly increase its power plant by a 140-horsepower producer gas engine, its fourth big engine, and it is expected that this engine will soon be worked to its utmost in grinding the lens mirrors and the curved front door strips of the multiplex lamps. It is claimed

manufacturing motor car and launch tops and capitalized at \$10,000. The following officers were elected: M. L. Dyer, president; S. D. Bolton, vice-president; C. A. Fox, secretary and treasurer; A. W. Myers, superintendent. The temporary offices and factory are at 1104 North Saginaw street, which allows a daily output of from seventy-five to 100 tops. A. W. Meyers will act as superintendent.

**Death of George Bradley**—George J. Bradley, of the Diamond Rubber Co.'s sales organization, died at his home in Cleveland Thursday, January 27, after a short illness of pneumonia. Mr. Bradley was manager of the Detroit and Cleveland branches of the Diamond company. He had been with the company 7 years, his initial experience having been that of salesman in the New York city branch. Five years ago he was made manager of the Cleveland branch and somewhat later the Detroit branch was also placed under his management. Prior to his connection with the Diamond organization, Mr. Bradley was with the March-Davis Co., of Chi-



# Brief Business Announcements



**Rochester, N. Y.**—F. C. Shutt has added the Middleby to his other cars.

**Pittsburg, Pa.**—The Thomas Automobile Co. will build a new garage at once at 5509 Baum street.

**Nashville, Tenn.**—Howard, Gregor & Co., local agent for the Hudson, is now located in their new home on Third avenue.

**Poughkeepsie, N. Y.**—The new plant of the Fiat Automobile Co. is practically completed and machinery is now being installed.

**Cleveland, O.**—W. L. Hurdle has been appointed agent here for the Keystone and will establish headquarters on Euclid avenue, near Sixty-fifth street.

**Pittsburg, Pa.**—The Pittsburg Auto Equipment Co. has bought the entire plant of the Union Auto Repair Co., whose windshield it has been selling for 6 months.

**Columbia, Tenn.**—George T. Hughes has been appointed sub-agent for the Chalmers-Detroit and Hudson and will cover this city, together with Lawrenceburg and Pulaski.

**Youngstown, O.**—The Mauser Autocab Co. has been incorporated and is to do a general taxicab and motor truck business. The company is to fit up a garage on Walnut street.

**Newark, N. J.**—Alexander Brunner will go into business on his own account. He has made arrangements for a garage at 441 South Eleventh street and already has made arrangements to represent the Kline in this city.

**Pittsburg, Pa.**—The Automobile Accessories Co. announces its opening at Center avenue and Beatty street, east end. This concern has the agency for the Pennsylvania tire in the Pittsburg district. William B. Yoder is manager.

**Philadelphia, Pa.**—The Fiat Automobile Co. has leased for a term of years the entire building at 325-327 North Broad street, and in the future the interests of this company will be looked after in this city by H. Neubauer and C. M. Hamilton.

**Rochester, N. Y.**—During the construction of its new building on Clinton street, opposite Washington park, the Gillis-Strickland Motor Co. is occupying temporary quarters in the Cutler building. The new home of the Chalmers, Hudson and Locomobile will be a fine place.

**Pittsburg, Pa.**—The Pittsburg, Harmony, Butler and New Castle Street Railway Co. has started a taxicab service for its passengers at Butler Pa., 30 miles north of Pittsburg. New taxicabs will meet all cars at that station and make a charge of only 5 cents to any point in the district bounded by Washington, Wayne and Mc-

Kean streets, with a 10-cent fare beyond that limit.

**Lansing, Mich.**—The Tourists Auto Co., of Detroit, has been incorporated with a capital stock of \$5,000.

**Detroit, Mich.**—The Craig Auto Co., of 295 Jefferson avenue, is to act as agent for the Abbott-Detroit car in this state.

**Hartford, Conn.**—W. W. Lester has taken the local agency for the Brush runabout. This is the first appearance of that car in this city.

**Rochester, N. Y.**—Kate & Pawlik will soon move their garage and repair shop from 55 Franklin street to Court and Courtland.

**Boston, Mass.**—The Overland Motor Co., of Boston, is now located in its new quarters at 161 Columbus avenue. Charles G. Andrews is now the manager of the company.

**Cleveland, O.**—The Sterling will be represented in this city by the Sterling Motor Sales Co., a new concern with a capital stock of \$30,000, of which J. C. Kloepeke is manager.

**Rochester, N. Y.**—The Mabbett-Bettys Motor Car Co., agent for Stevens-Duryea and Cadillac, has moved from its old place on Plymouth street to the new location on Court street, just east of Clinton.

**Rochester, N. Y.**—The garage and salesrooms of A. Vernon Hart were badly damaged by fire. Several cars were scorched and otherwise injured and an estimated loss of \$10,000 was sustained. Mr. Hart handles the Thomas, Oakland and Columbia electric.

**Goshen, N. Y.**—A meeting of the board of trade was held on January 14 and much interest was taken in the development of the Coates-Goshen car. One hundred and fifty thousand dollars has been subscribed by members of the board for the erection of a new factory for the manufacture of

the car, and it is expected to start with an output of 150 cars per annum.

**Pittsburg, Pa.**—The Keystone Automobile Co. has secured the Pittsburg agency for the Marmon.

**Cleveland, O.**—The Crest Motor Car Co. is to handle the Warren. The company is to open up headquarters on Euclid avenue.

**Seattle, Wash.**—W. F. Plastine has been appointed manager in this city of the electric sales and garage business of the Studebaker Automobile Co.

**Rochester, N. Y.**—The Hollis-Rand Co., agent for Speedwell and Pullman cars, has opened up temporary quarters at 10 East avenue, in the Triangle building.

**Rochester, N. Y.**—F. W. Peck has just finished his new salesroom at 228-230 Williams street and is now entrenched with the E-M-F, the Flanders, Studebaker-Garford 40 and Schacht.

**Uniontown, Pa.**—The Tri-State Garage Co. has started business at 74-76 East Fayette street, with John C. Shaw as manager. The company will handle the White and Ford cars this year.

**Boston, Mass.**—The Bi-Motor Equipment Co. announces the opening of a new branch at 113 Massachusetts avenue under the management of Russell T. Treen, and will carry a line of supplies.

**Pittsburg, Pa.**—J. D. Curr, of the North Side Rubber Co., Pittsburg branch, has bought an interest in the Eastern Automobile Co., on South avenue, Wilkesburg, Pa. This latter concern has secured the agency for the Kline.

**Boston, Mass.**—J. W. Crowell, who conducts two garages in Newton Centre, near Boston, has been given the agency for Atlas cars in his territory. He will open headquarters in Boston as soon as he can find a desirable location.

**Cleveland, O.**—Harry S. Moore, agent for the Stoddard-Dayton, has made arrangements for the opening of a garage and salesroom at 2034-2036 Euclid avenue, but will continue his former place of business at 1761 Crawford road.

**Baltimore, Md.**—The National car is being handled in Baltimore by the Lambert Automobile Co., which has been the local representative for the Maxwell for several years. The company also will continue as agent for the Maxwell.

**Rochester, Pa.**—The Beaver Valley Motor Co., of Rochester, Pa., has been organized, with Stanley Q. Brown, of Rochester, as manager. It will have headquarters in the Traction building on Railroad street, recently vacated by the Auto Sales Co. Mr. Brown has secured the agency for the Reo and the Oldsmobile.



**Wilmington, Del.**—American Engine and Motor Co., capital stock \$1,000,000, to manufacture rotary engines, motor cars, motor vehicles and power boats.

**Trenton, N. J.**—Druck Auto Selling Co., capital stock \$30,000.

**St. Louis, Mo.**—Tower Grove Motor Car Co., capital stock \$5,600, to manufacture and deal in motor cars; incorporators, Thomas W. and H. B. Wiley and F. L. Schleicher.

**Chicago, Ill.**—The Charles Lange & Brothers Co., capital stock \$5,000, to engage in the manufacture of buggies, wagons, sleighs, motor cars, etc.; incorporators, A. T. Martin, A. C. Greene and A. Pinger.

**Sheboygan, Wis.**—Maurer Garage Co., capital stock \$15,000; incorporators, G. O. Franche, A. G. Maurer and F. G. Voigt.